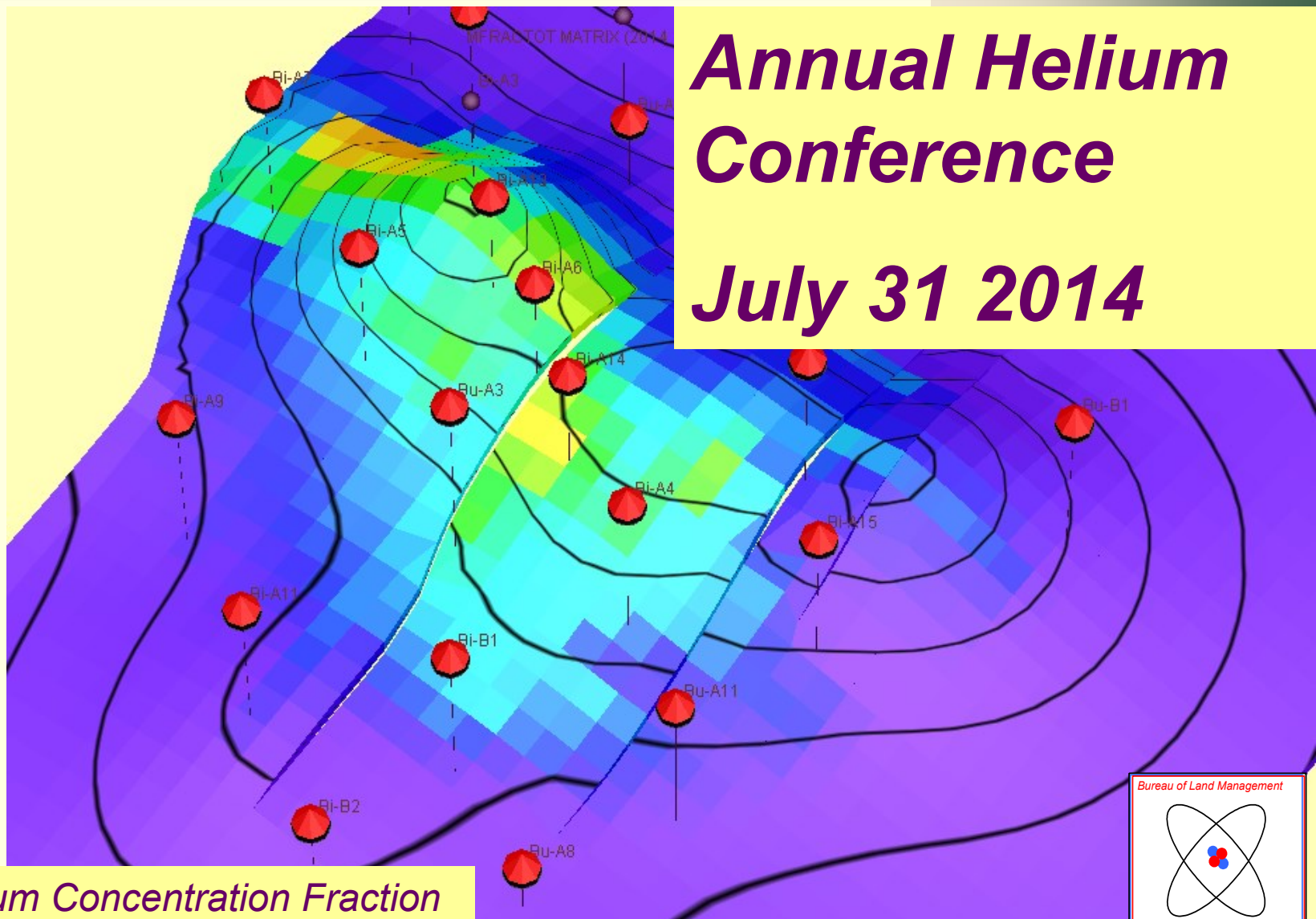


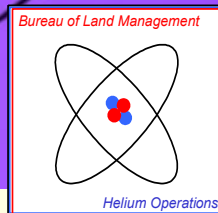
Bush Dome Helium Reservoir



***Annual Helium
Conference
July 31 2014***



***Helium Concentration Fraction
June 30 2014***



Outline



- Reservoir Status (Operations: 2013-2014)
- Reservoir History & Life Cycle (Depletion)
- Simulation Model Status
- Predictions
- Conclusions



*Training ride Denver Jun 7 – Hail
Eli age 8 on tandem*

Reservoir Status 2014

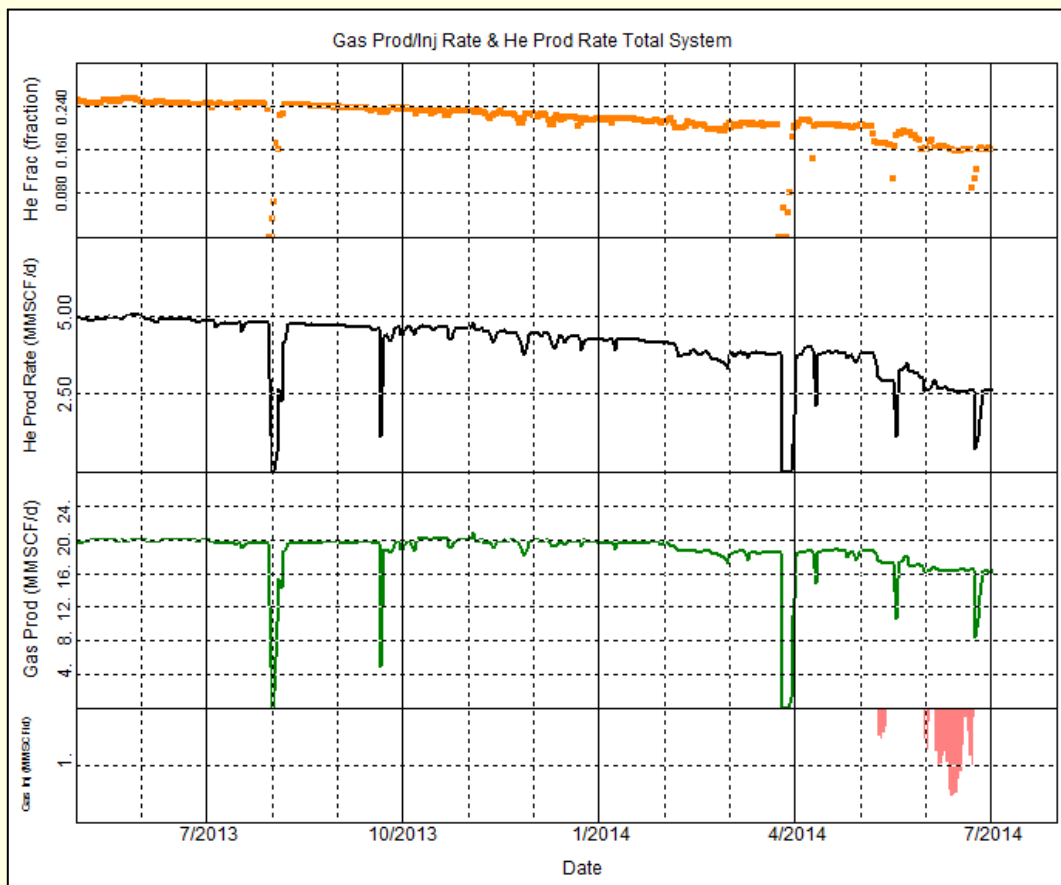


- Field & Bi-A6 Operations Summary:
 - July 2013 – 2014
 - Comparison to prior years
- Production Analysis
- Helium concentration maps
- Flowing WHP

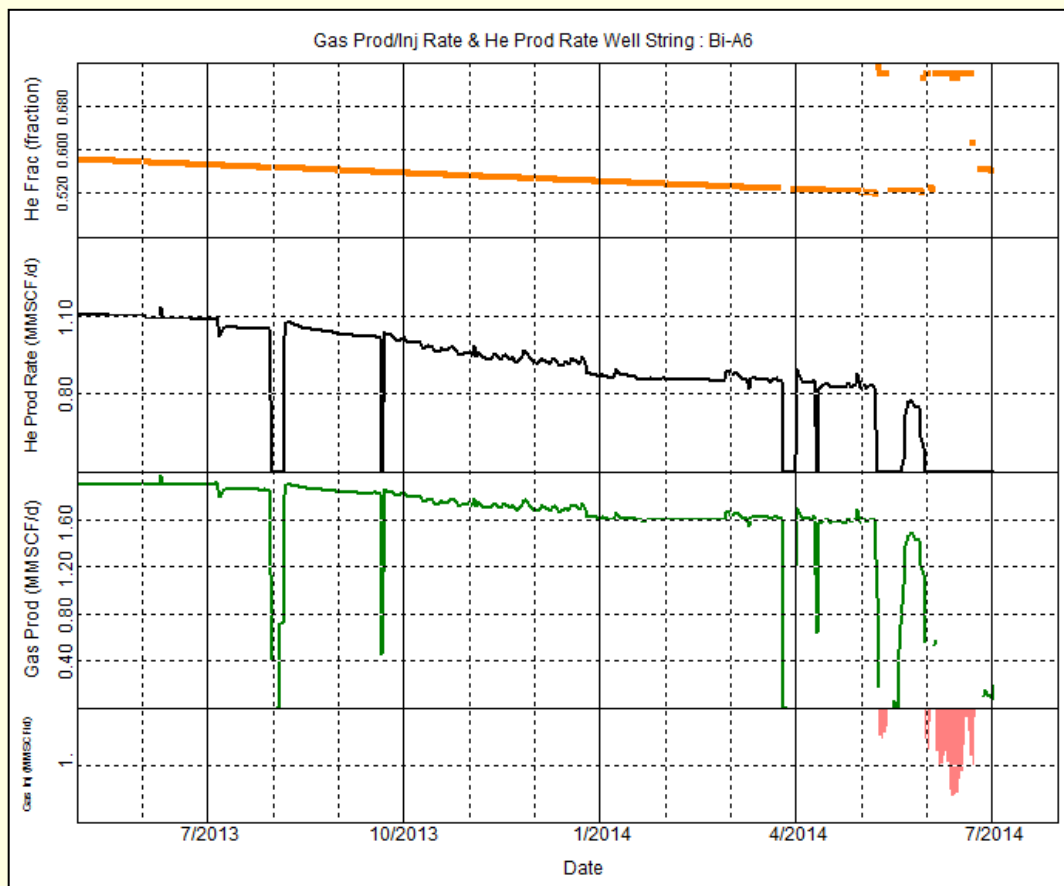
Reservoir Status 2014



Field & HEU Summary		
July-July 2013-14		
HEU Operating	359	days
HEU Down	6	days
He rate < 1MM/d	11	day
He rate > 6.25mm/d	0	days
Beg. Avg Flowing Press	286.7	psia
End Avg Flowing Press	276.7	psia
Change in Flowing Press	-10	psi
Total Gas Produced	6.669	BCF
Total Gas Injected	-0.021	BCF
Net Gas	6.648	BCF
He Produced	1.428	BCF
He Injected	-0.015	BCF
He Net	1.412	BCF



Reservoir Status 2014



Bi-A6 Summary		
July-July 2013-14		
Producing	324	days
Injecting	27	days
No Flow	14	days
Total Gas Produced	524.92	MMcf
Total Gas Injected	-20.8	MMcf
Net Gas	504.1	MMcf
He produced	297.81	MMcf
He injected	-15.3	MMcf
Net He	282.5	MMcf
Beginning He %	0.59%	
Ending He%	0.68%	
Change in He%	0.09%	
Bi-A6 produced 20% of 2013-2014 Helium		

Reservoir Status 2014



Field & HEU Summary		
July-July 2013-14		
HEU Operating	359	days
HEU Down	6	days
He rate < 1MM/d	11	day
He rate > 6.25mm/d	0	days
Beg. Avg Flowing Press	286.7	psia
End Avg Flowing Press	276.7	psia
Change in Flowing Press	-10	psi
Total Gas Produced	6.669	BCF
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Reservoir Status 2014



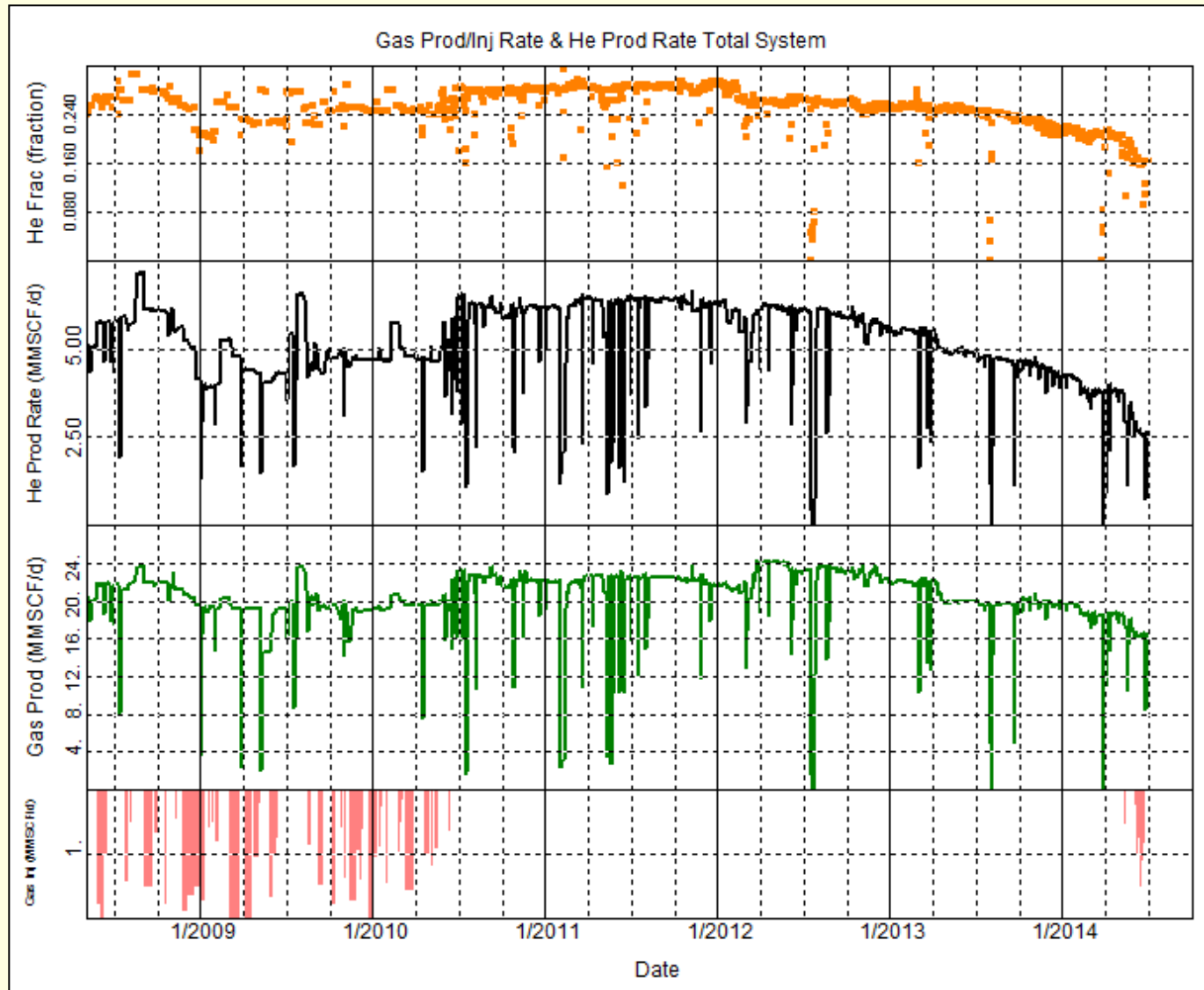
Field Production: 20089- 2014

Field & HEU Summary									
		beginning July 2009	2010	2011	2012	2013		5 Year	2004-14
		ending July 2010	2011	2012	2013	2014		Totals	Avg
HEU Operating	days	361	351	355	361	359		1787	357.4
HEU Down	days	4	14	0	4	6		28	5.6
He rate < 1MM/d	days	0	2	0	4	11		17	3.4
He rate > 6.25mm/d	days	28	222	242	3	0		495	99
Beginning Pressure	psia	388**	360**	329**	297**	270**		388**	
Ending Pressure	psia	360**	329**	297**	270**	270**		270**	
Change	psi	-28	-31	-32	-27	0		-118	
Total Gas Produced	BCF	7.155	7.279	8.154	7.797	6.669		37.054	7.411
Total Gas Injected	BCF	-0.209	0.000	0.000	0.000	-0.021		-0.230	-0.046
Net Gas	BCF	6.946	7.279	8.154	7.797	6.648		76.543	7.365
He Produced	BCF	1.817	2.123	2.263	1.970	1.428		9.601	1.920
He Injected	BCF	-0.163	0.000	0.000	0.000	-0.015		-0.178	-0.036
He Net	BCF	1.654	2.123	2.263	1.970	1.412		9.422	1.884
**Flowing Pressures								++ BH Res Press.	

Reservoir Status 2014



Field Production: 2009 - 2014



Reservoir Status 2014



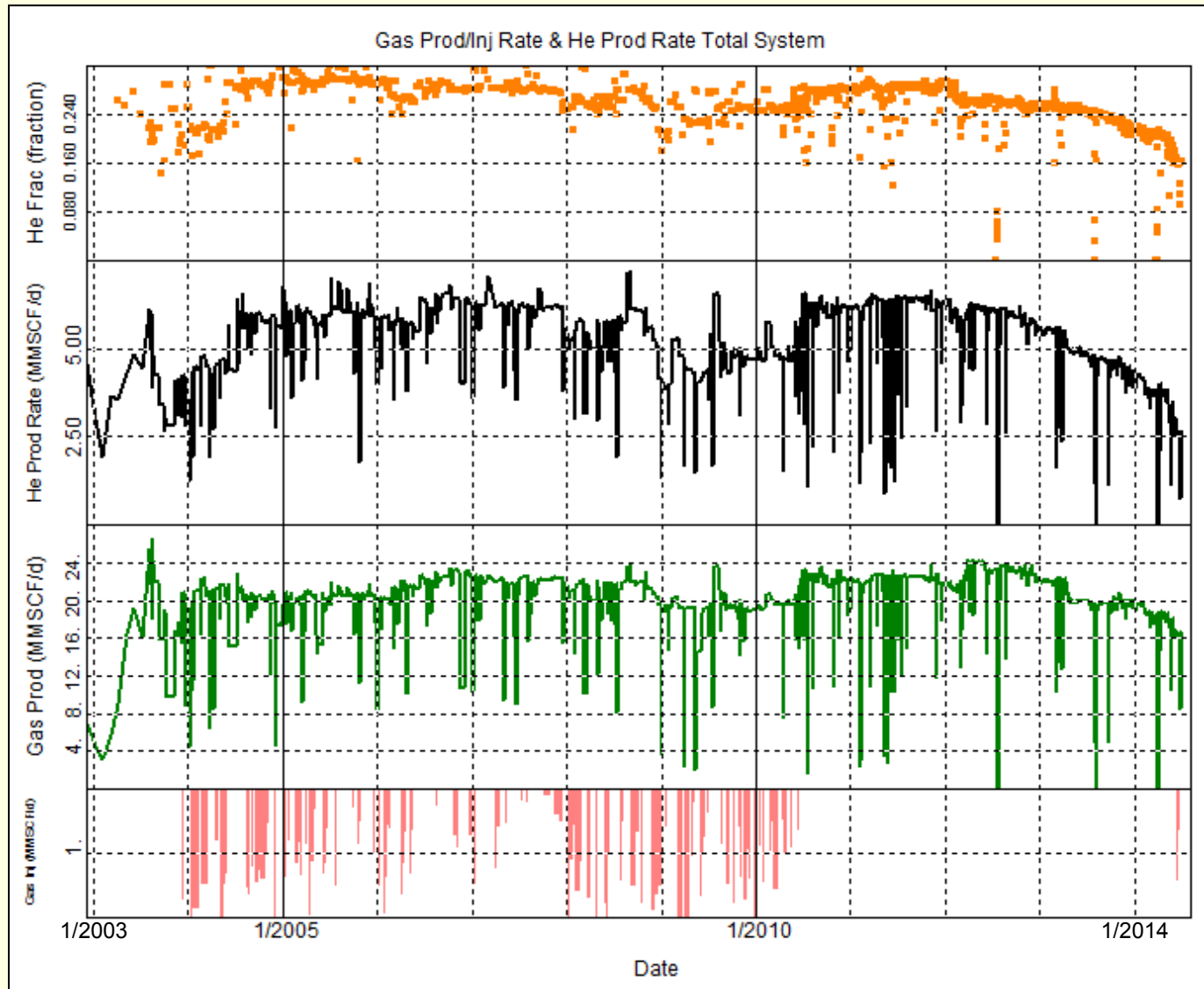
Field Production: 2003 - 2014

Field & HEU Summary															
beginning July 2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013		11 Year	2004-14		
ending July 2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014		Totals	Avg		
HEU Operating	days	248	332	348	334	351	348	361	351	355	361	359	3748	350	
HEU Down	days	118	33	17	31	15	17	4	14	0	4	6	259	14.1	
He rate < 1MM/d	days	8	35	0	0	1	0	0	2	0	4	11	61	5.3	
He rate > 6.25mm/d	days	16	30	82	189	43	35	28	222	242	3	0	495	87.4	
Beginning Pressure	psia	648	626	601	575	548	523	388**	360**	329**	297**	270**	648++		
Ending Pressure	psia	626	601	575	548	523	498	360**	329**	297**	270**	270**	330++		
Change	psi	-22	-25	-26	-27	-25	-25	-28	-31	-32	-27	0	-318		
Total Gas Produced	BCF	6.156	5.026	7.226	7.509	7.431	7.174	7.155	7.279	8.154	7.797	6.669	77.576	7.142	
Total Gas Injected	BCF	-0.179	-0.060	-0.041	-0.060	-0.183	-0.279	-0.209	0.000	0.000	0.000	-0.021	-1.033	-0.085	
Net Gas	BCF	5.977	4.966	7.185	7.449	7.248	6.895	6.946	7.279	8.154	7.797	6.648	76.543	7.057	
He Produced	BCF	1.289	1.262	2.077	2.176	1.930	1.852	1.817	2.123	2.263	1.970	1.428	20.187	1.890	
He Injected	BCF	-0.139	-0.047	-0.033	-0.048	-0.144	-0.218	-0.163	0.000	0.000	0.000	-0.015	-0.806	-0.067	
He Net	BCF	1.150	1.215	2.045	2.128	1.786	1.634	1.654	2.123	2.263	1.970	1.412	19.381	1.823	

Reservoir Status 2014



Field Production: 2003 - 2014

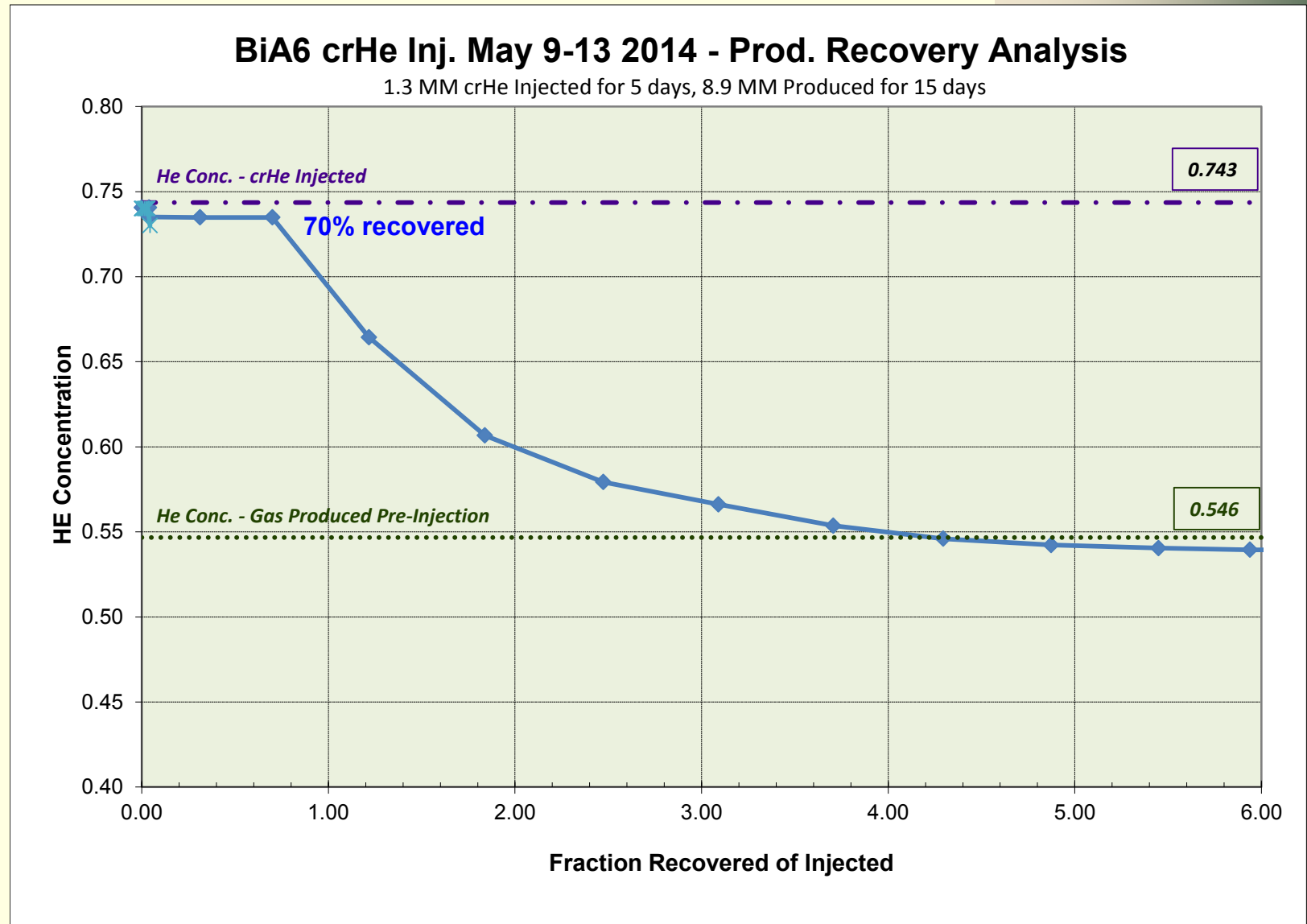




■ Summary – 2013-14 Operations

- Bu-A9 (C1 well) could not be revived (prod issues)
 - Used as methane and well site compressor fuel
- Bi-A3 production issues continued, shut-in Nov 2013
 - max rate - ~300 Mcf/d July 2013,; ~200 Mcf/d Nov 2013
- Field/HEU at max He July 2013-Dec 2013
 - He rate declines from ~4.9 to 4.3 MM/d
 - Total gas rate stable at ~20 MM/d
 - Most wells are flowing at pressure limit 270 psia
- Reduced He demand Jan 2014 – July 2014
 - He rate declines from ~4.3 to ~2.6 MM/d
 - Total gas rate declines from ~20 to ~16 MM/d
 - He Inj starts May 9 2013, continues most of June 2013
 - Production after 1.3 MM injection shows good recovery, but insufficient volume and low flow rates for full analysis

Reservoir Status 2014





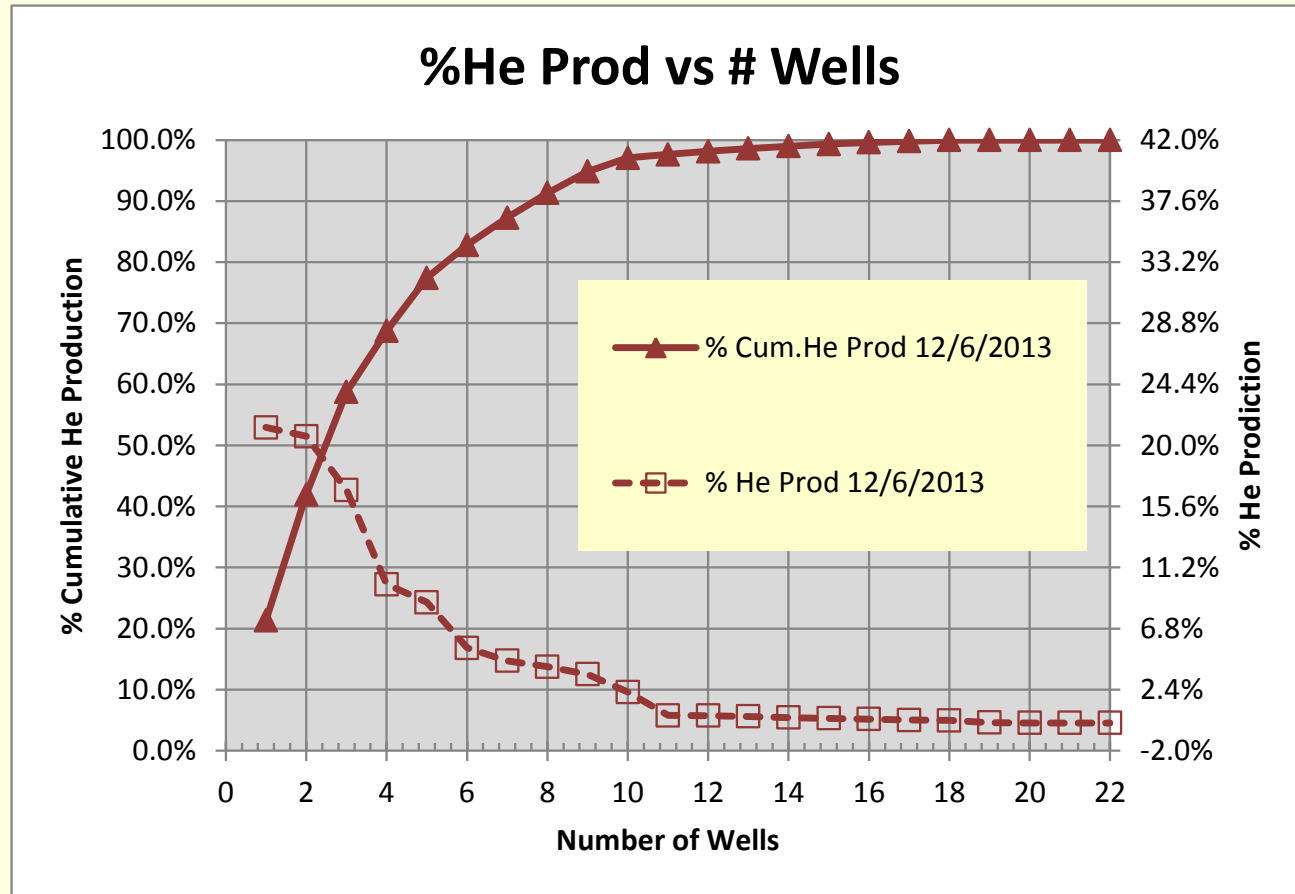
■ Summary – 2013-14 Operations

- Operating min FWHP ~270 psia vs. theoretical ~235 psia
- Wells flowing at min FWHP, rate declines over time
 - July 2013- Dec 2013: 11 wells FWHP, BiA14, BiA13 site compr.
 - Jan 2014 – Jun 2014: 15 wells FWHP, site compr as needed
- Dec 6 2013 vs. Jun 30 2014 (high vs. low He demand)
 - 3 wells produce 58.7% of He
 - 4 wells produce 68.7% of He

Reservoir Status 2014



■ Summary – 2013-14 Operations

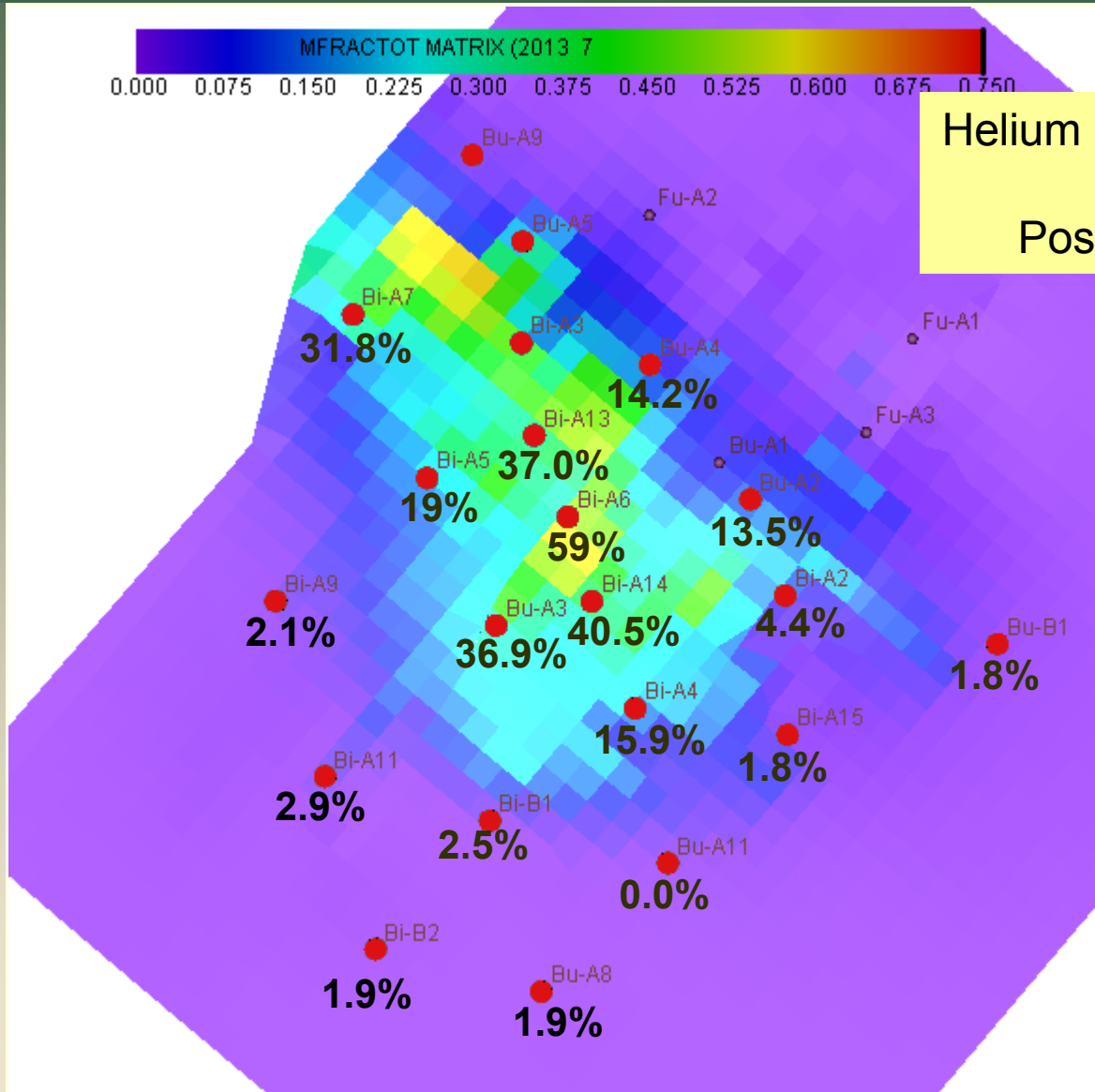


Reservoir Status 2014

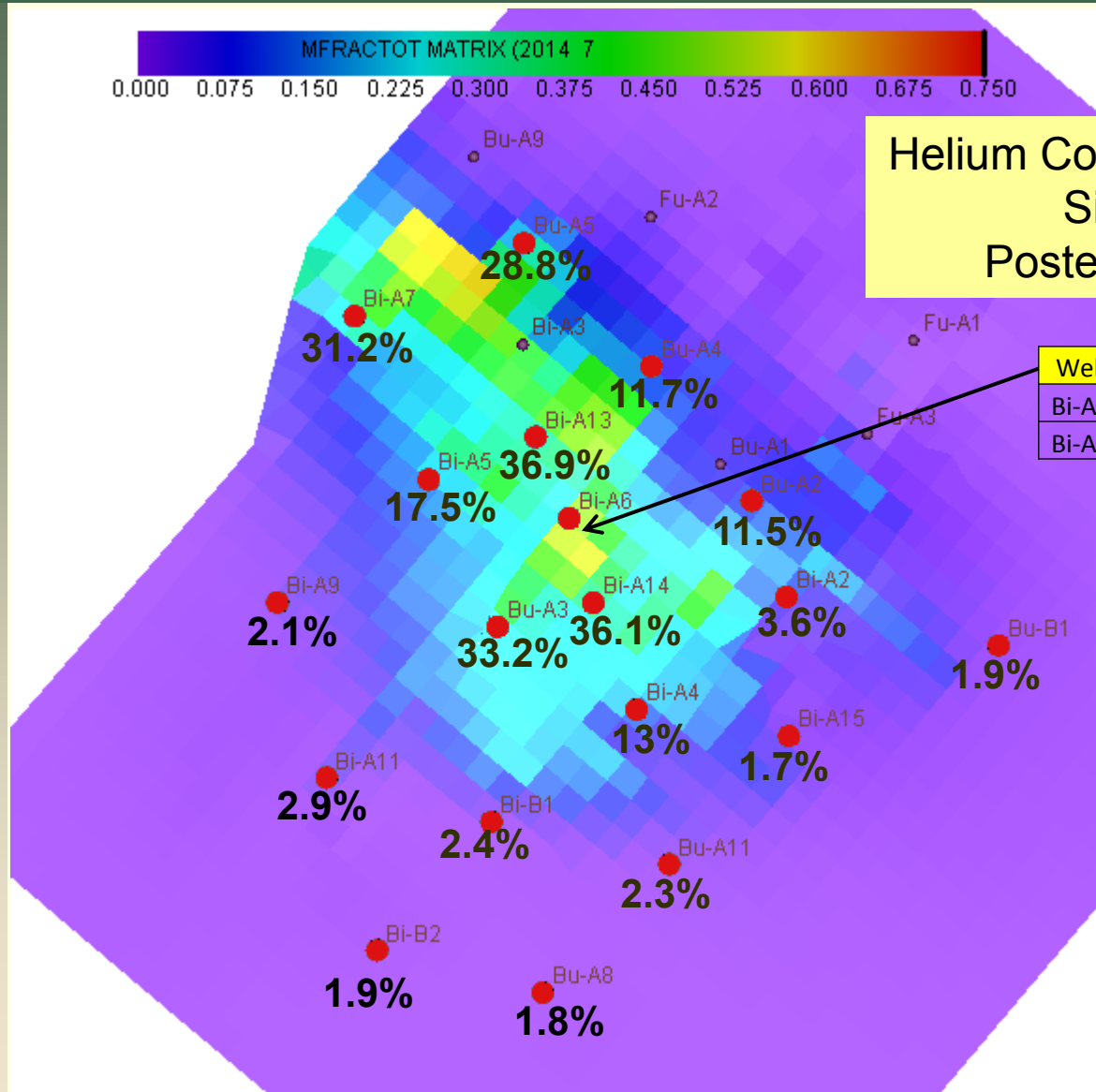


- Helium concentration maps
 - July 1 2013
 - June 30 2014
 - Change in He %

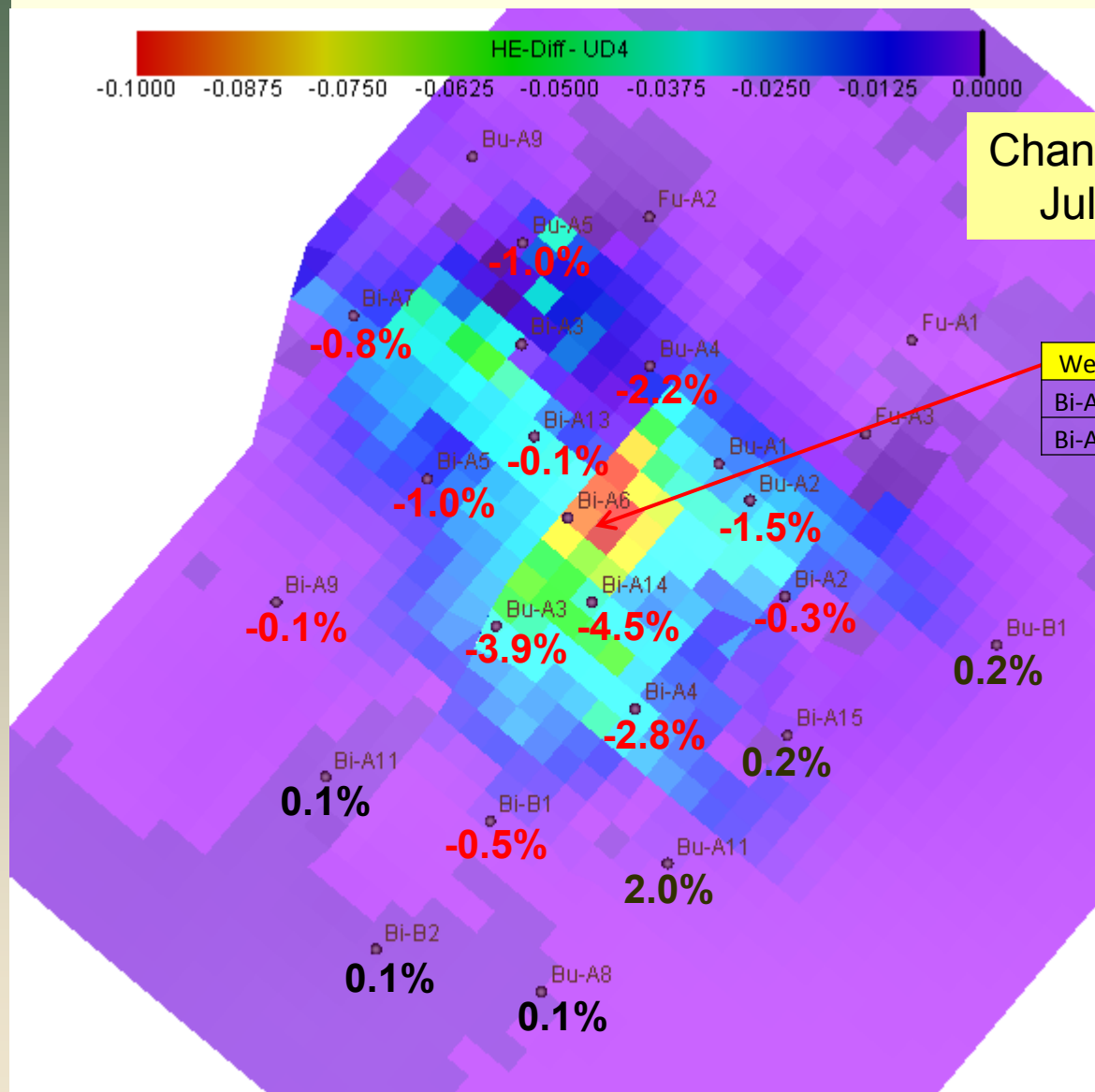
Reservoir Status 2014



Reservoir Status 2014



Reservoir Status 2014



Change in He Concentration
July 2013 to June 2014

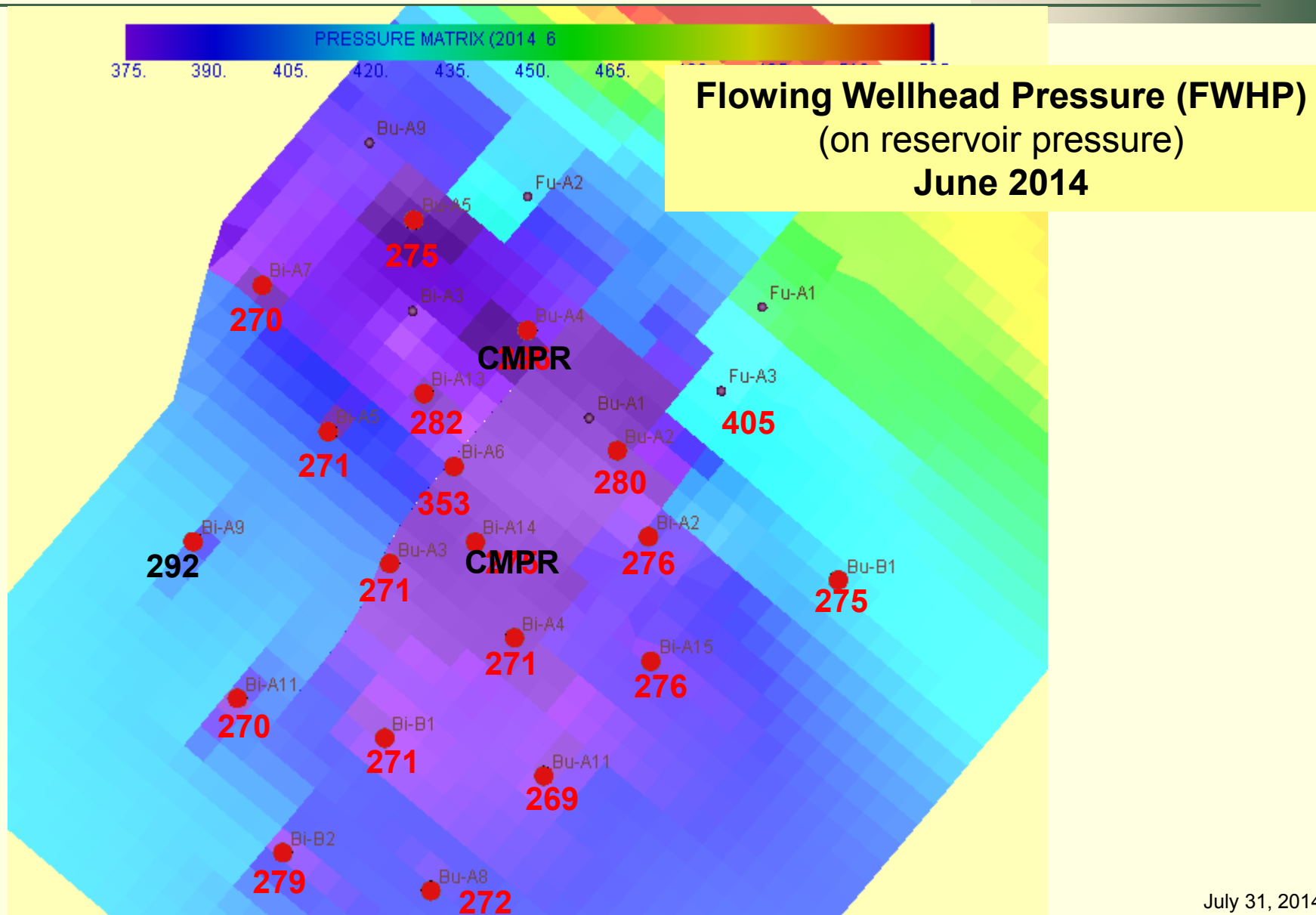
Well	Date	He Conc. Diff	
Bi-A6	5/8/2014	He Conc. Prior injection	-4.8%
Bi-A6	6/30/2014	He Conc. end of update	14.5%

Reservoir Status 2014



- June 30, 2014 – Flowing WHP

Reservoir Status 2014



Reservoir Status 2014



■ Conclusions

- 2013-14 field performance is as expected:
 - Declining total gas and He rate due to FWHP limit
- Low Demand period (Jan – Jun...):
 - Some small pressure recovery as gas rate is reduced from center Higher He wells; not expected to have significant impact / improvement on production rates for any length of time.
 - HEU able to operate at 16 MM/d, but not operating at the max He rate possible which has an impact on maximizing total He recoverable by 2021



■ Conclusions

■ Low Demand period (Jan – Jun...):

- Impact of short term low demand (e.g. Oct 2015) should not be significant, but is being studied
- Impact of long term low demand (years) is not known, and currently not being studied
- Impact of short term crHe injection into Bi-A6 should not be significant, but there is insufficient data at this time for analysis
 - Only 1.3 MM was injected from May 9 – 13 followed by 8.9 MM production at low rate from May 14-Jun 29.
 - 2nd injection period from Jun 5 – 22 (12.4 MM) with no significant production (0.5 MM) prior to June 30

Outline



- *Reservoir Status (Operations: 2013-2014)*
- *Reservoir History & Life Cycle (Depletion)*
- *Simulation Model Status*
- *Predictions*
- *Conclusions*



Training ride Vail Pass – 10,600'

Reservoir History & Life Cycle

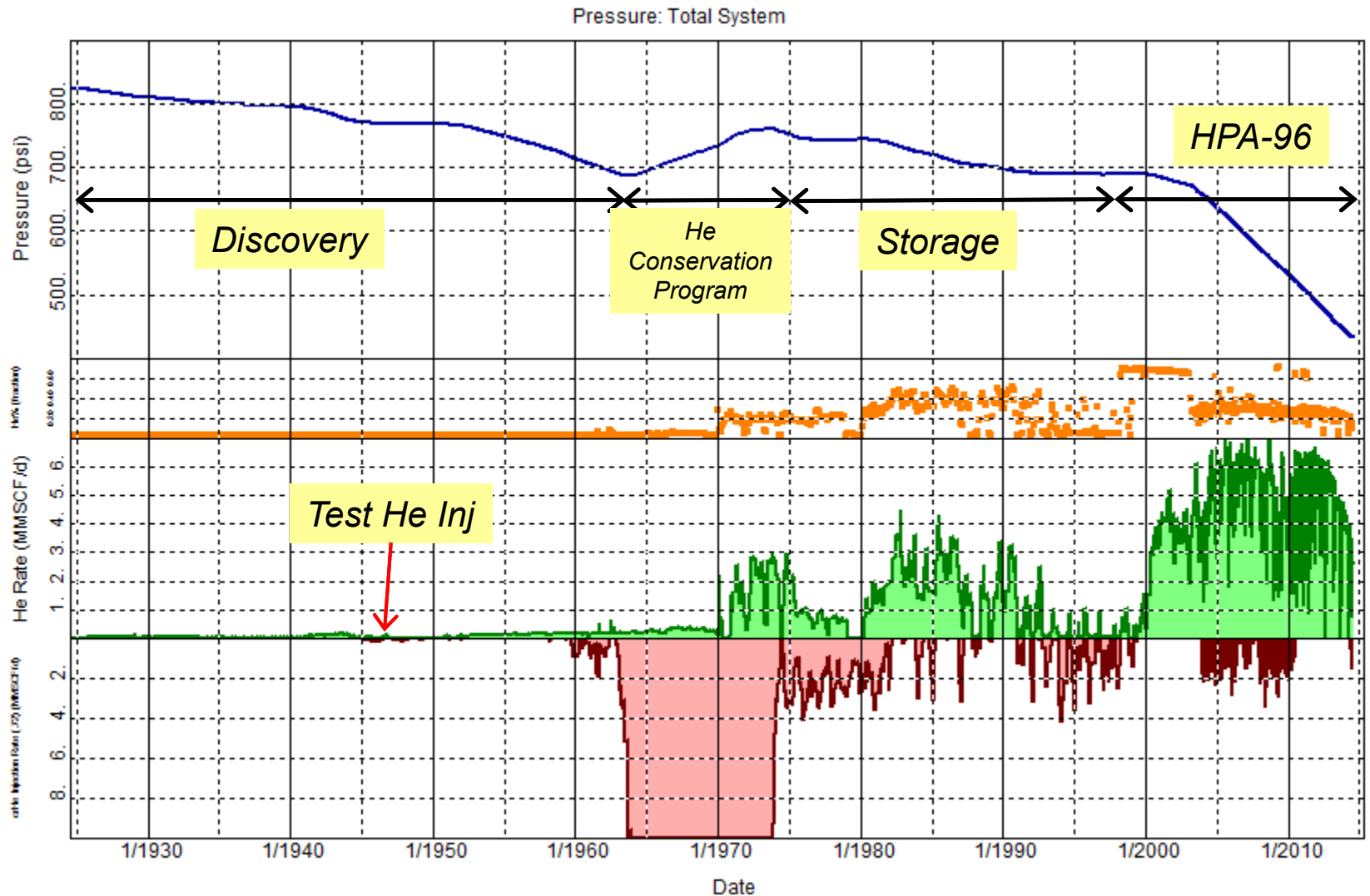


■ Brief Summary for new attendees

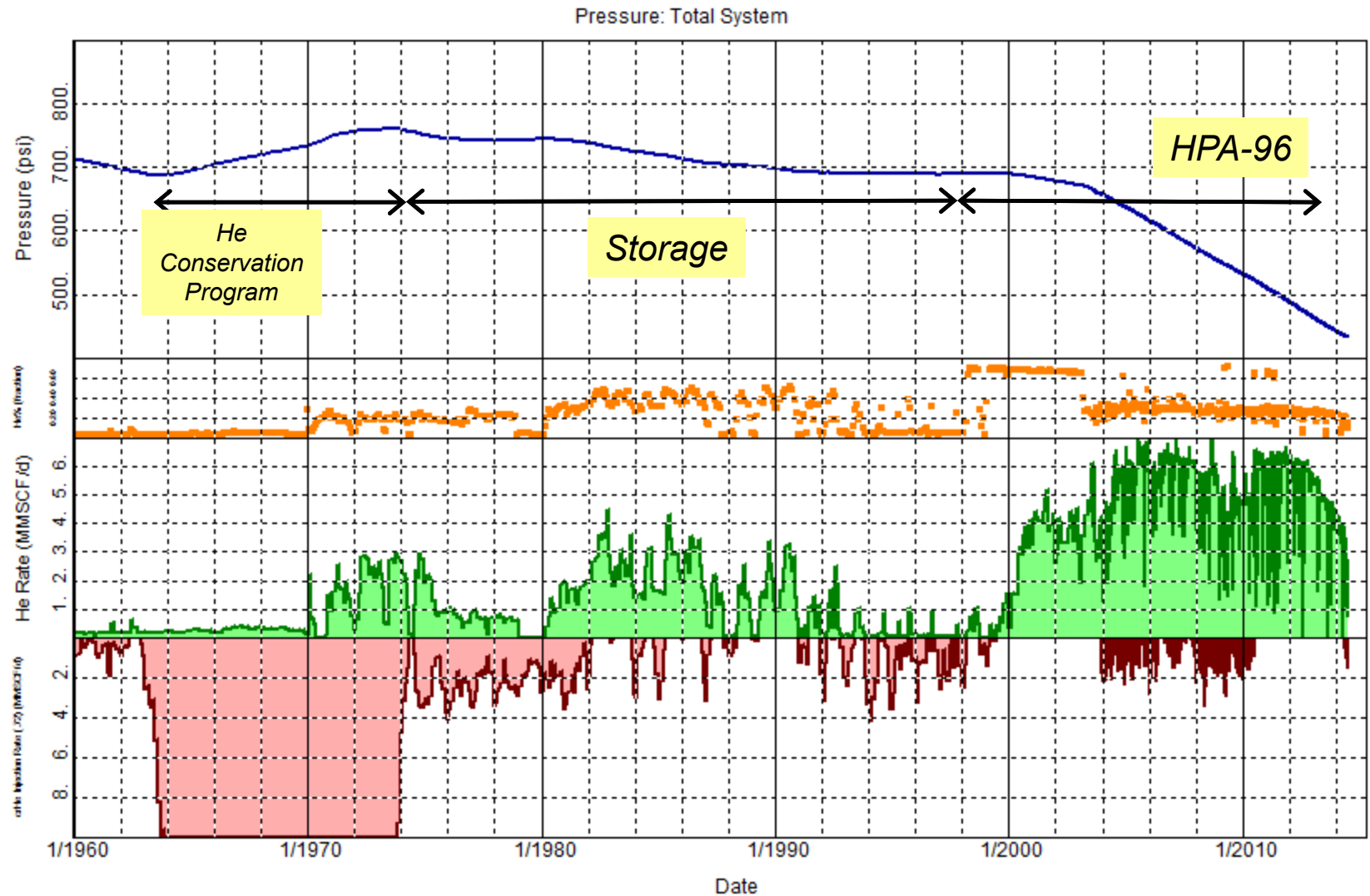
(and those who have forgotten)

- 1924: Discovered 1924, limited production
- 1929: Strategic US Asset, reserved prod.
- 1945: Tested He injection
- 1960: He Conservation Act
- 1963: Converted to storage
- 1973: End US purchase of crHe, opened access
- 1973-96: Storage / Cycling / Reduced Inventory
- 1996: He Privatization Act (HPA-96)
- 2002: Begin HPA-96, offer for sale 2.3 BCF
- 2003: HEU startup
- 2013: He Stewardship Act (HSA-2013)

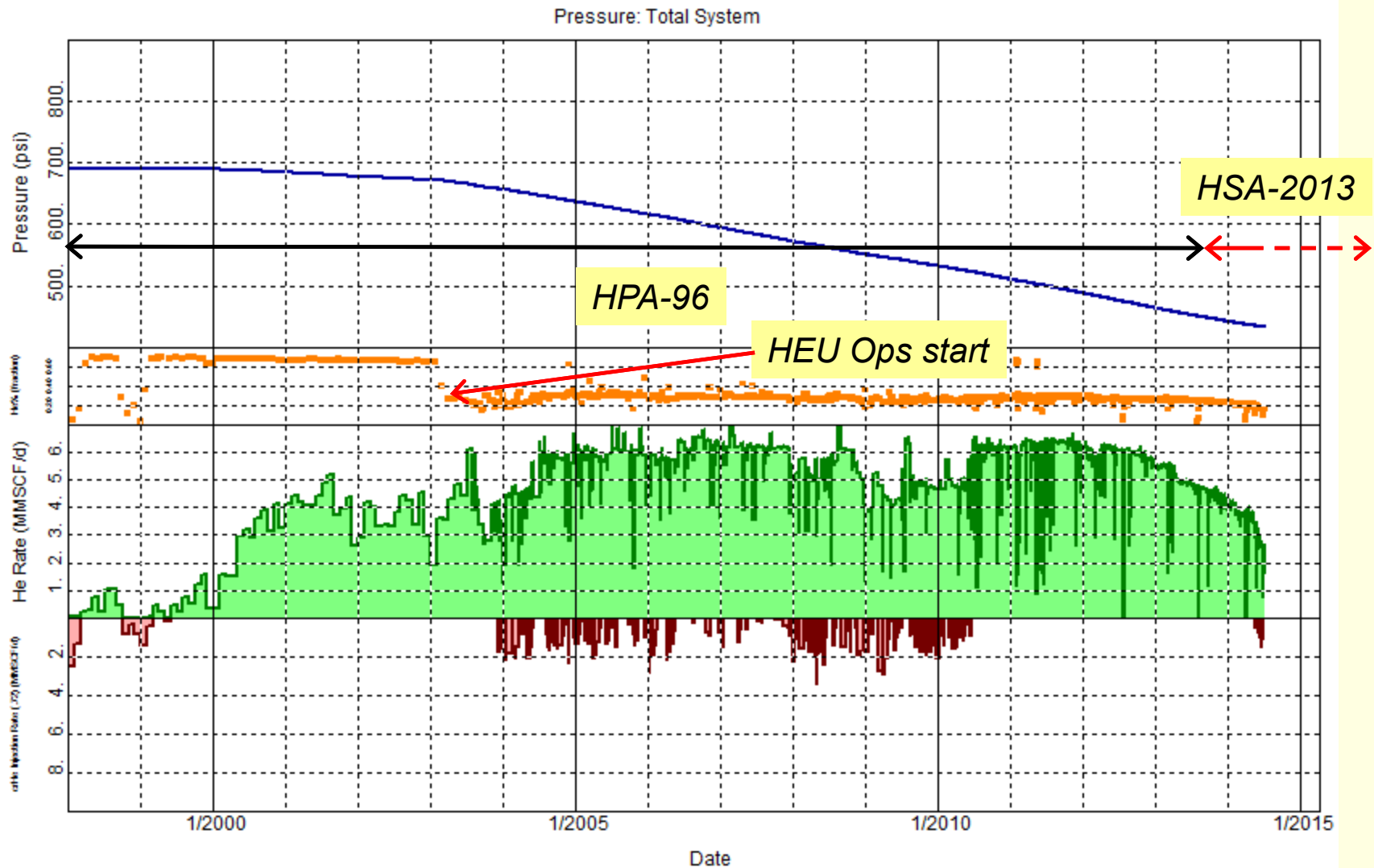
Reservoir History & Life Cycle



Reservoir History & Life Cycle



Reservoir History & Life Cycle



Reservoir History & Life Cycle



■ Bush Dome Reservoir Life Cycle

(presented in 2007)

■ Reservoir concepts:

- Not a storage tank – variable rock properties
- Fractured dolomite creates unique pathways for He injection, methane mixing, and water influx
- Ability to flow gas controlled by,
 - Surface facility constraints – HEU & Compression
 - Reservoir pressure
 - Well productivity (& number of wells)
- Maximizing He recovery:
Early (and all) studies show that producing gas at highest He concentrations and lowest total gas rate maximizes He recovery

Reservoir History & Life Cycle



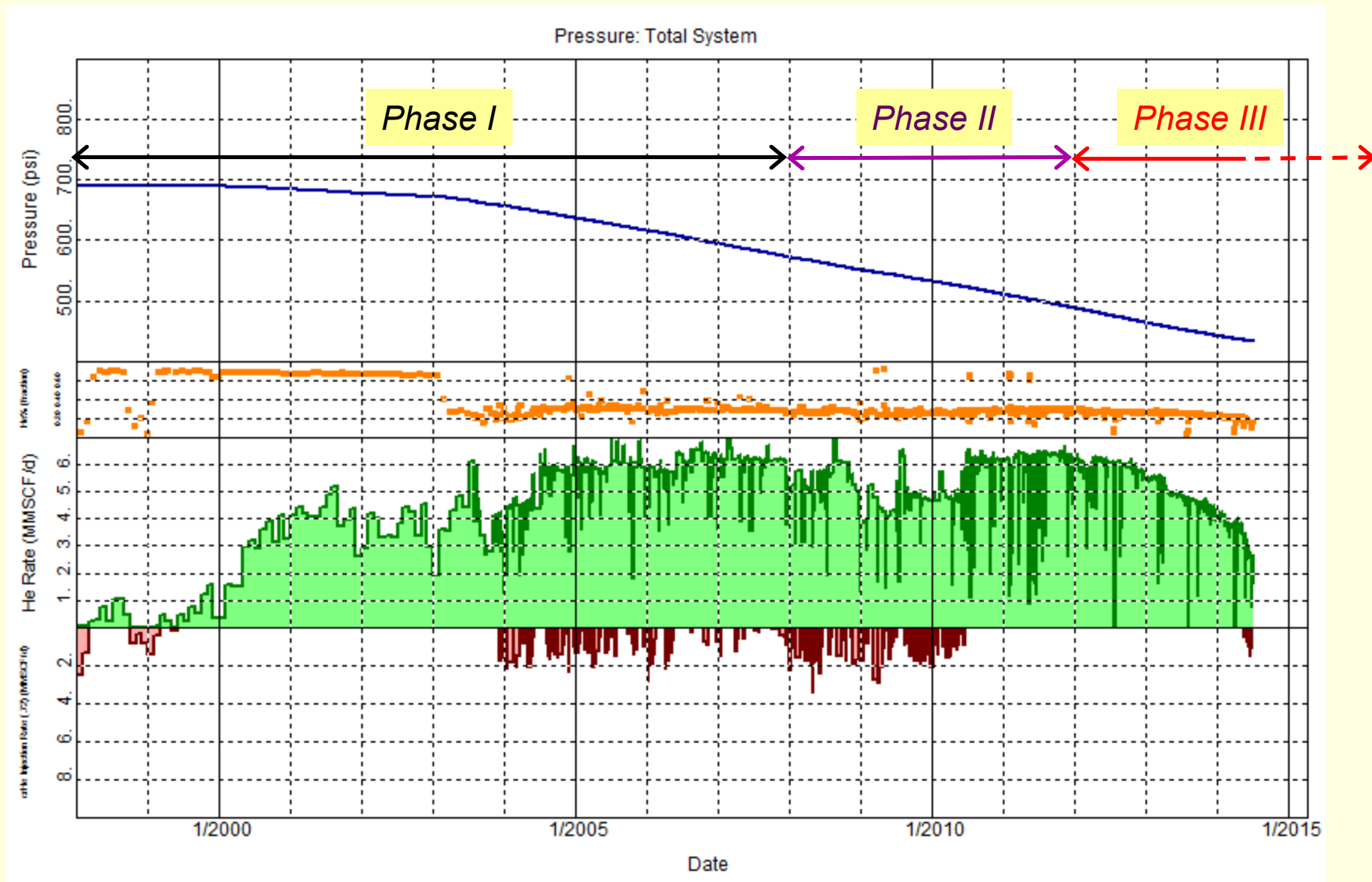
■ Bush Dome Reservoir Life Cycle

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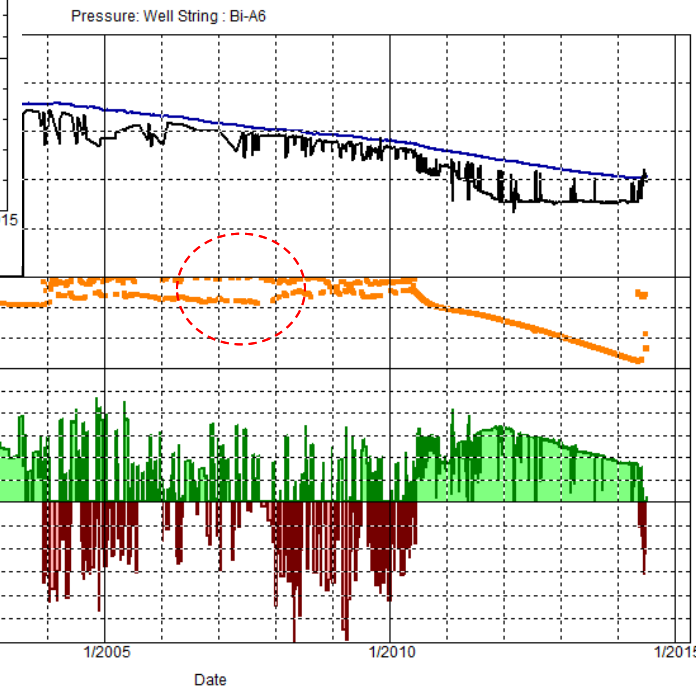
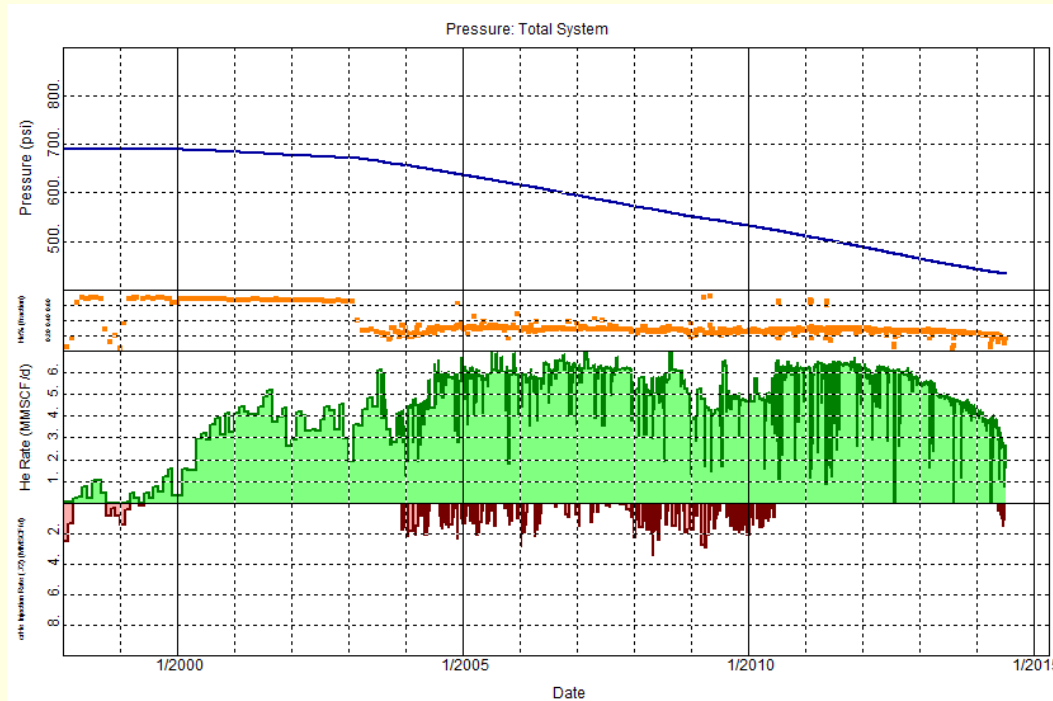
■ 3 Phases for the Life Cycle under depletion

- Phase I: crHe 24/7 at 6.25 MM/d
 - Required some wells with 72%+ He, pipeline pressure
 - Dates: 2002 – ~2008+
- Phase II: HPA-96 (6.2 MM/d He with HEU (not 24/7)
 - Required FWHP above P_{min} for compressor inlet
 - Dates: ~2009 - ~2012
- Phase III: Final Depletion – max He <6.2 MM/d
 - Reservoir/Wells at maximum output, facilities limited
 - Dates: ~2012 – 2021...
 - Not storage field,
now a depletion field with deferred delivery

Reservoir History & Life Cycle



Reservoir History & Life Cycle



Outline



- *Reservoir Status (Operations: 2013-2014)*
- *Reservoir History & Life Cycle (Depletion)*
- *Simulation Model Status*
- *Predictions*
- *Conclusions*



Frisco Dillon Lake – 9100'

Simulation Model Status- 2014



- Minor change to model in 2013-14 update
 - changes to improve He%/rate match for Bi-A6
- Updated rates and pressures for 2013-14:
 - Helium match:
 - Field Level: within 0.35% of 2014 He produced
Annual volume: 1.422 vs 1.427 Bcf (model vs. measured)
June 30 2014: 16.1% vs 16.4% He conc. (model vs. measured)
 - Most wells (20 of 22) within +/- 3% (very good+)
 - Well PI's tuned for 2014 performance data

Simulation Model Status- 2014

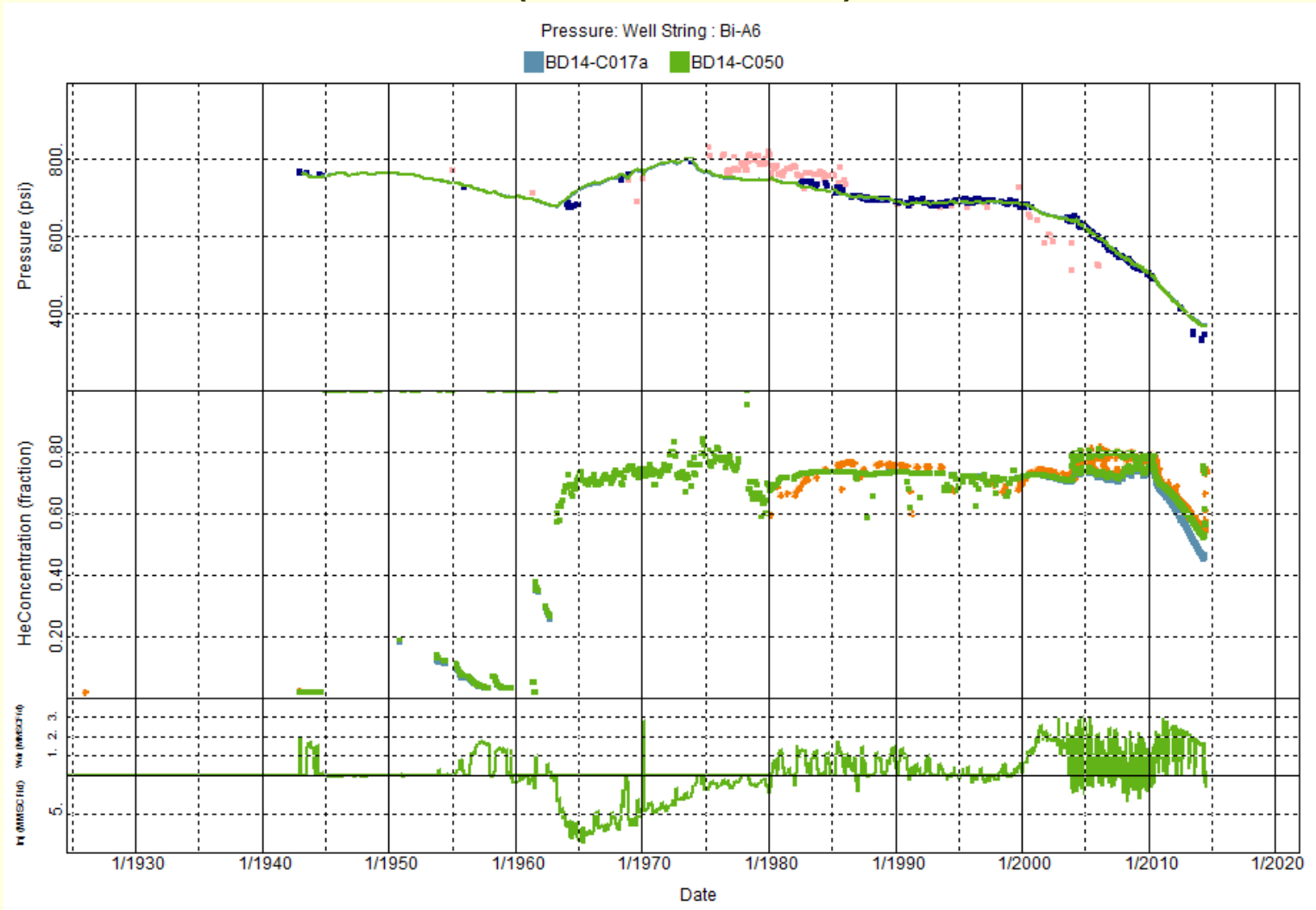


- Q: How accurate is the simulation model ?
 - Field Level – most important
 - Very good history match on pressure and He Prod
 - Model has over produced helium during early storage which is compensated by small under production 2000+
 - Previous predictions track well with historical trends
 - Predictions should be within +/- 5%
 - Well Level – key wells very important
 - Very good match on pressure and He Prod, but more variability
 - Match trends very good for most wells
 - Mismatches are balanced between wells (Field match)
 - Examples

Simulation Model Status - 2014



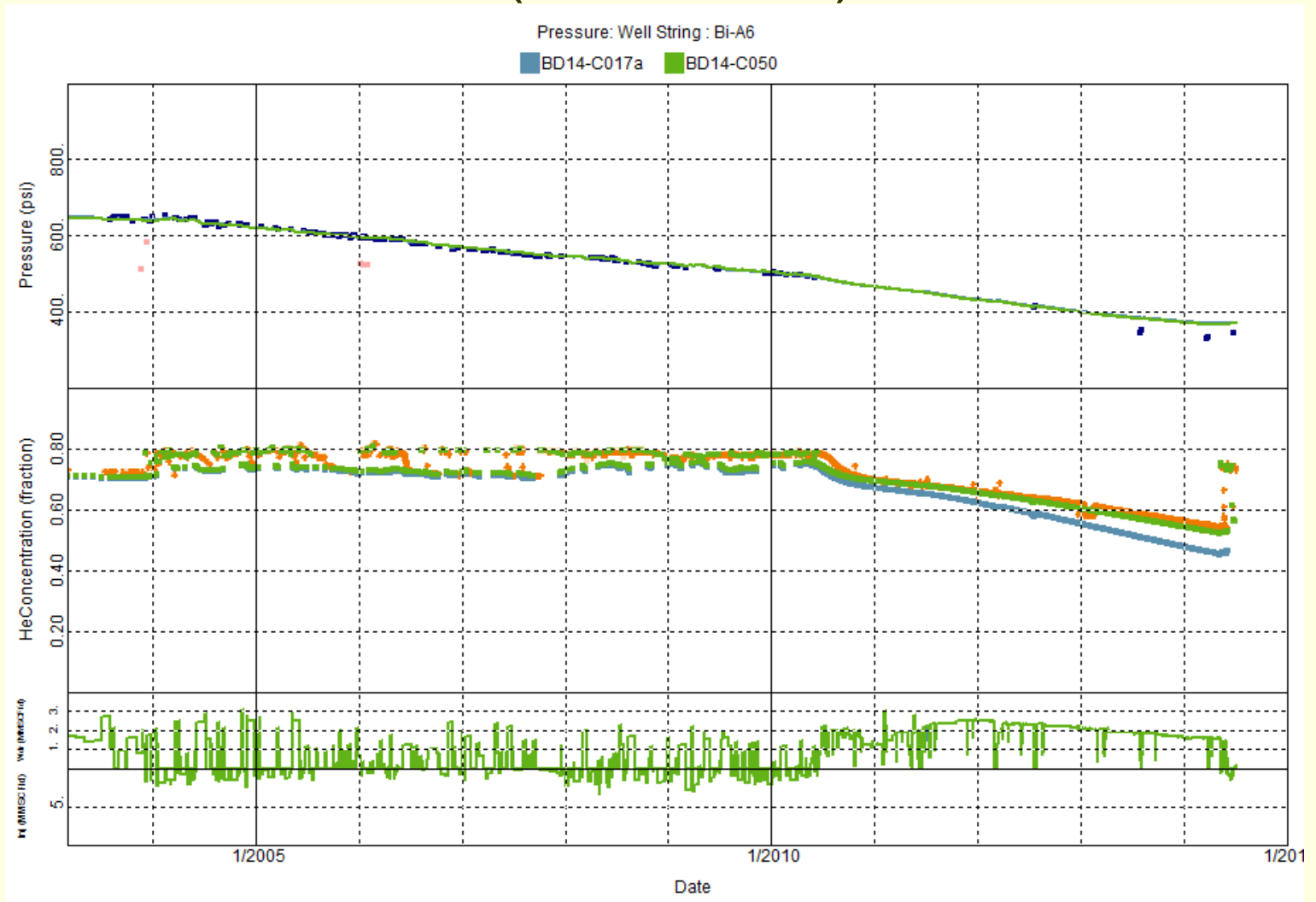
■ HM Plot – Bi-A6 (South Well)



Simulation Model Status - 2014



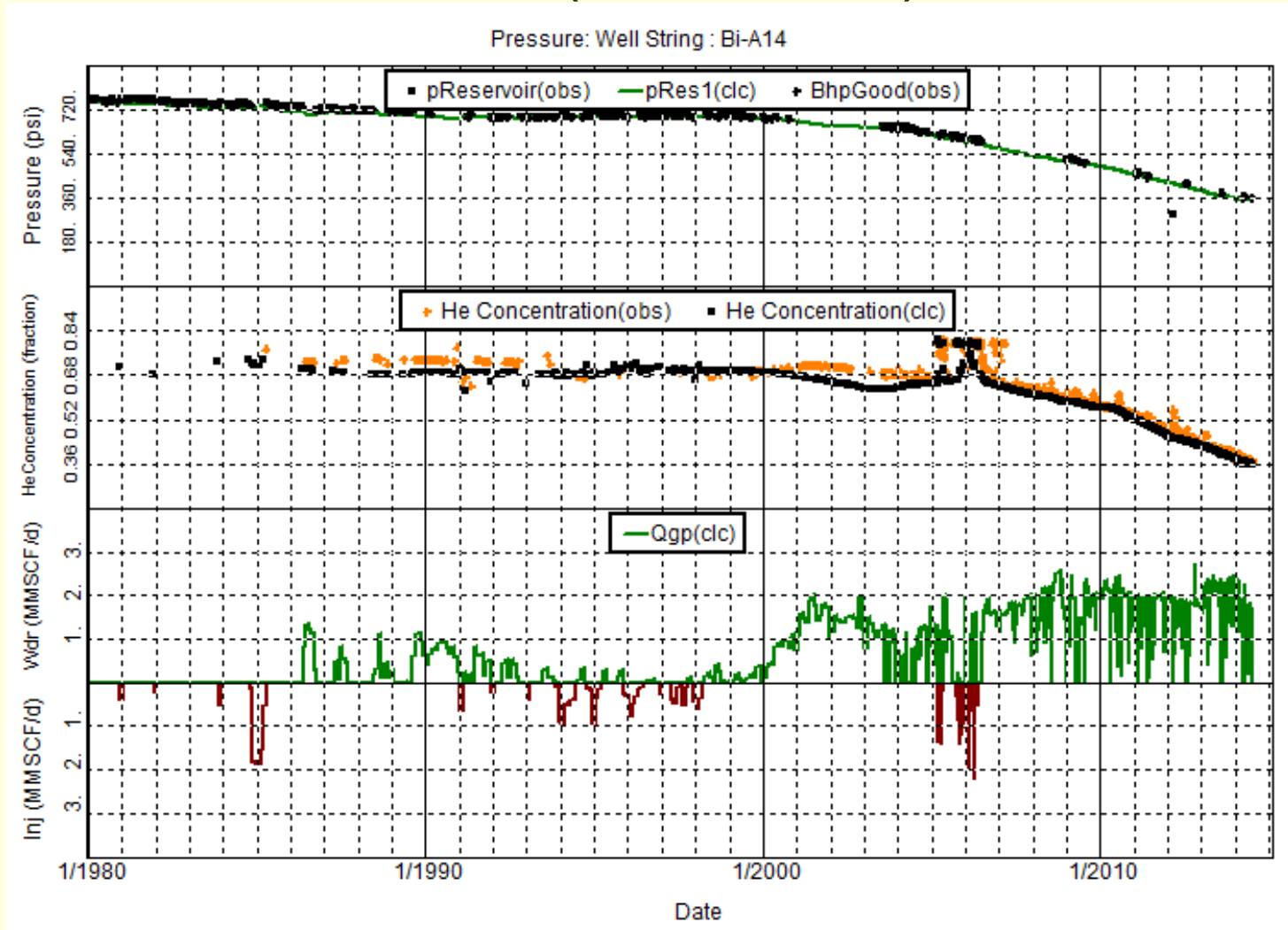
■ HM Plot – Bi-A6 (South Well)



Simulation Model Status - 2014



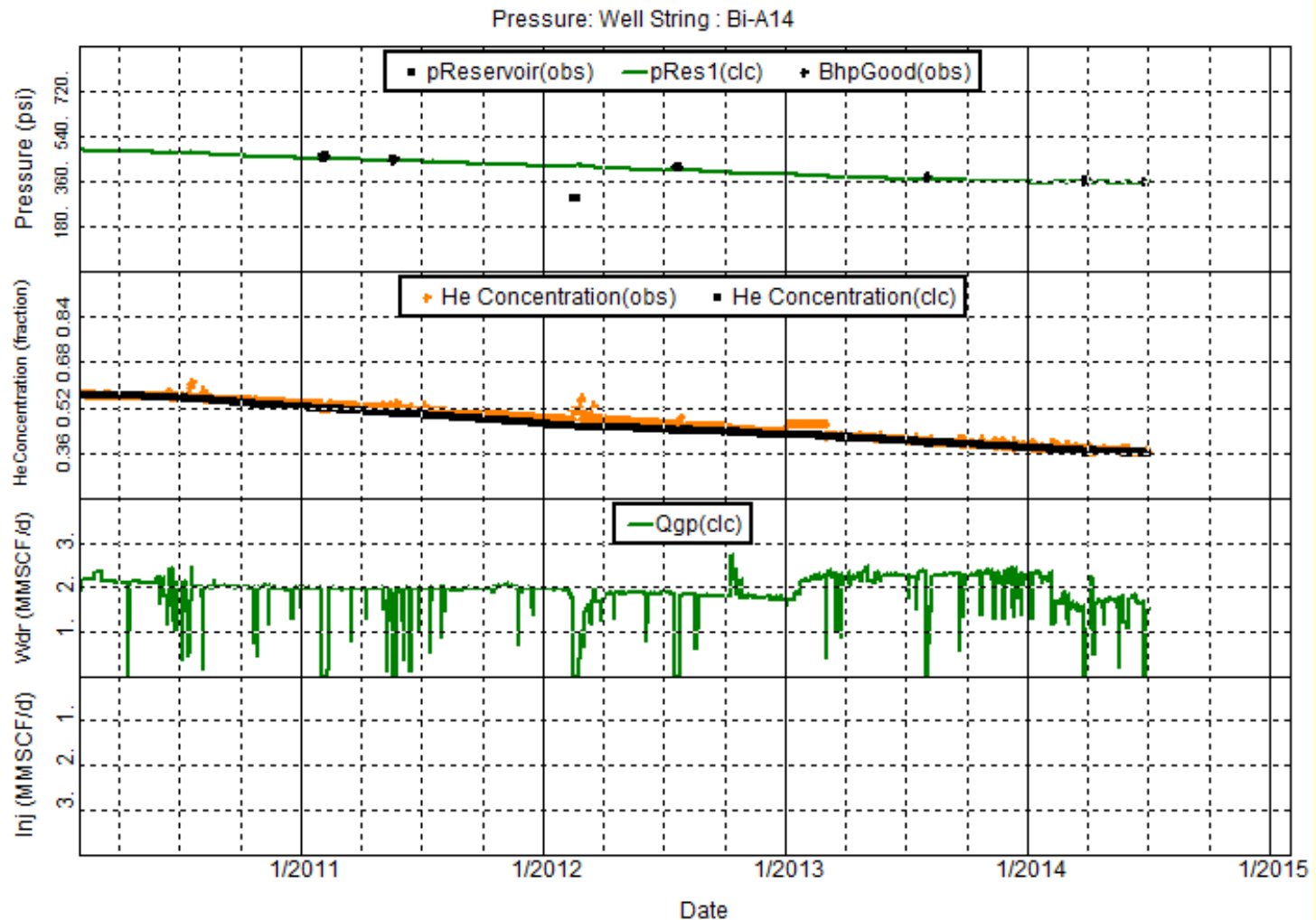
■ HM Plot – Bi-A14 (South Well)



Simulation Model Status - 2014



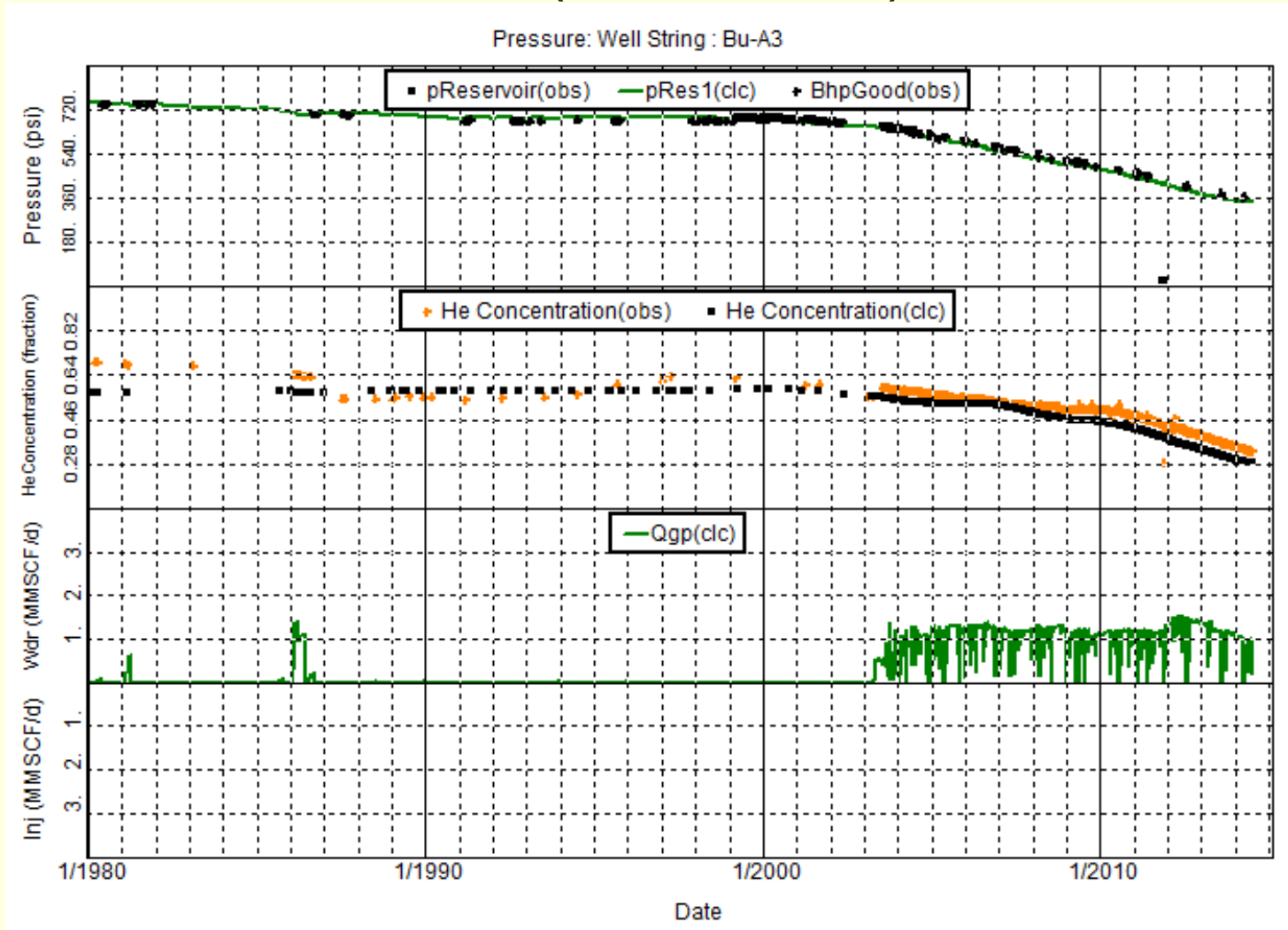
■ HM Plot – Bi-A14 (South Well)



Simulation Model Status - 2014



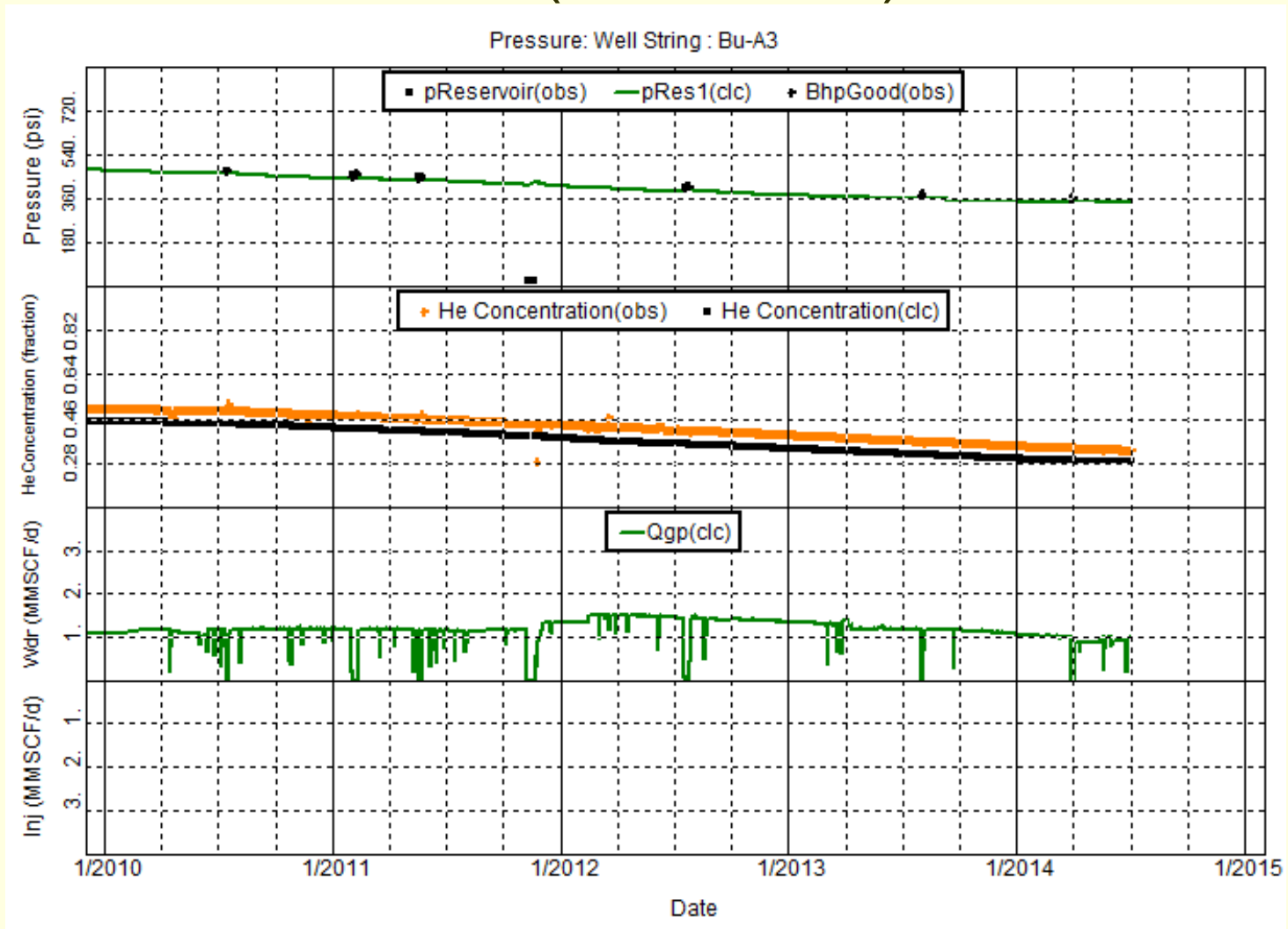
■ HM Plot – Bu-A3 (South Well)



Simulation Model Status - 2014



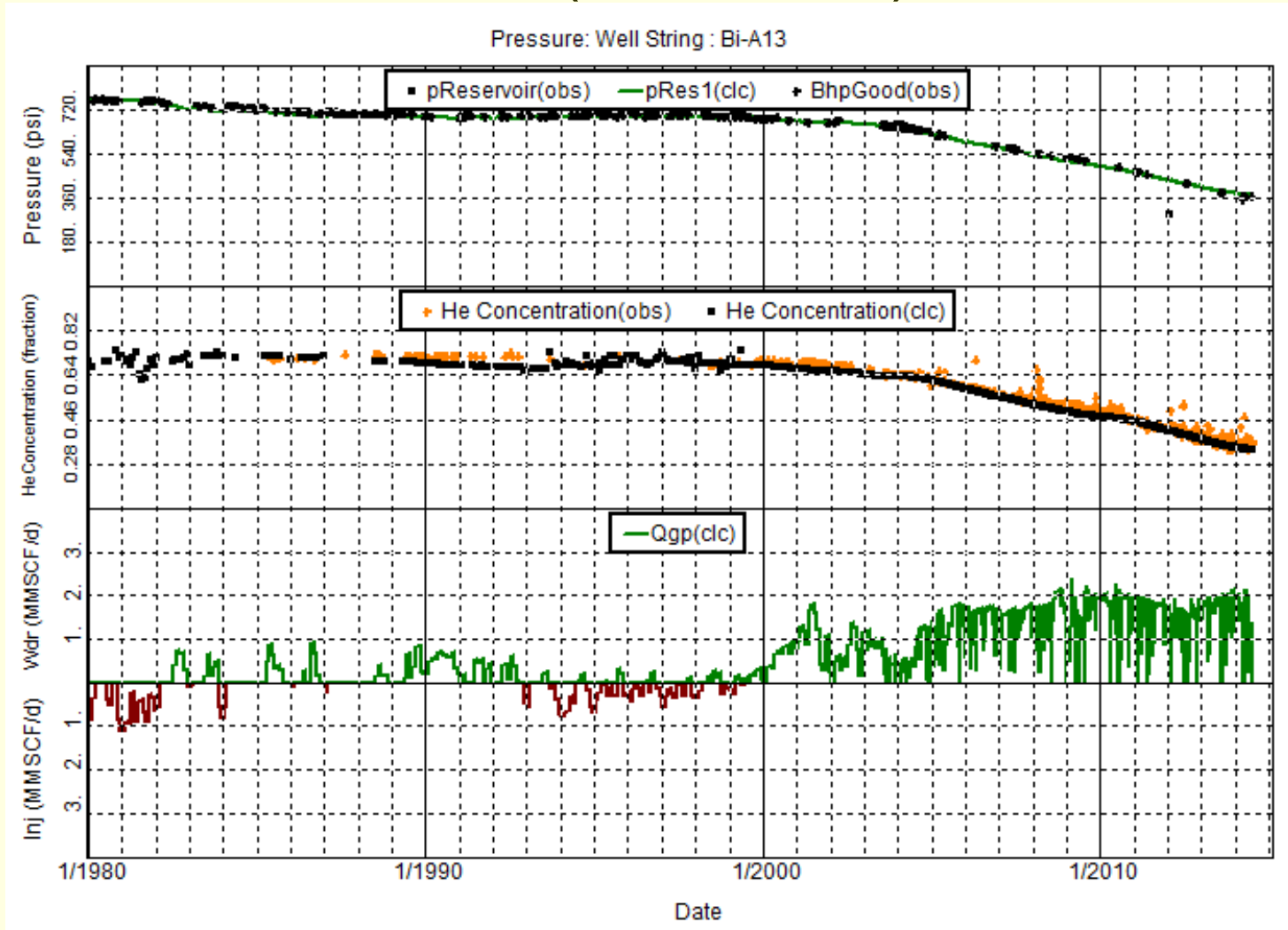
■ HM Plot – Bu-A3 (South Well)



Simulation Model Status - 2014



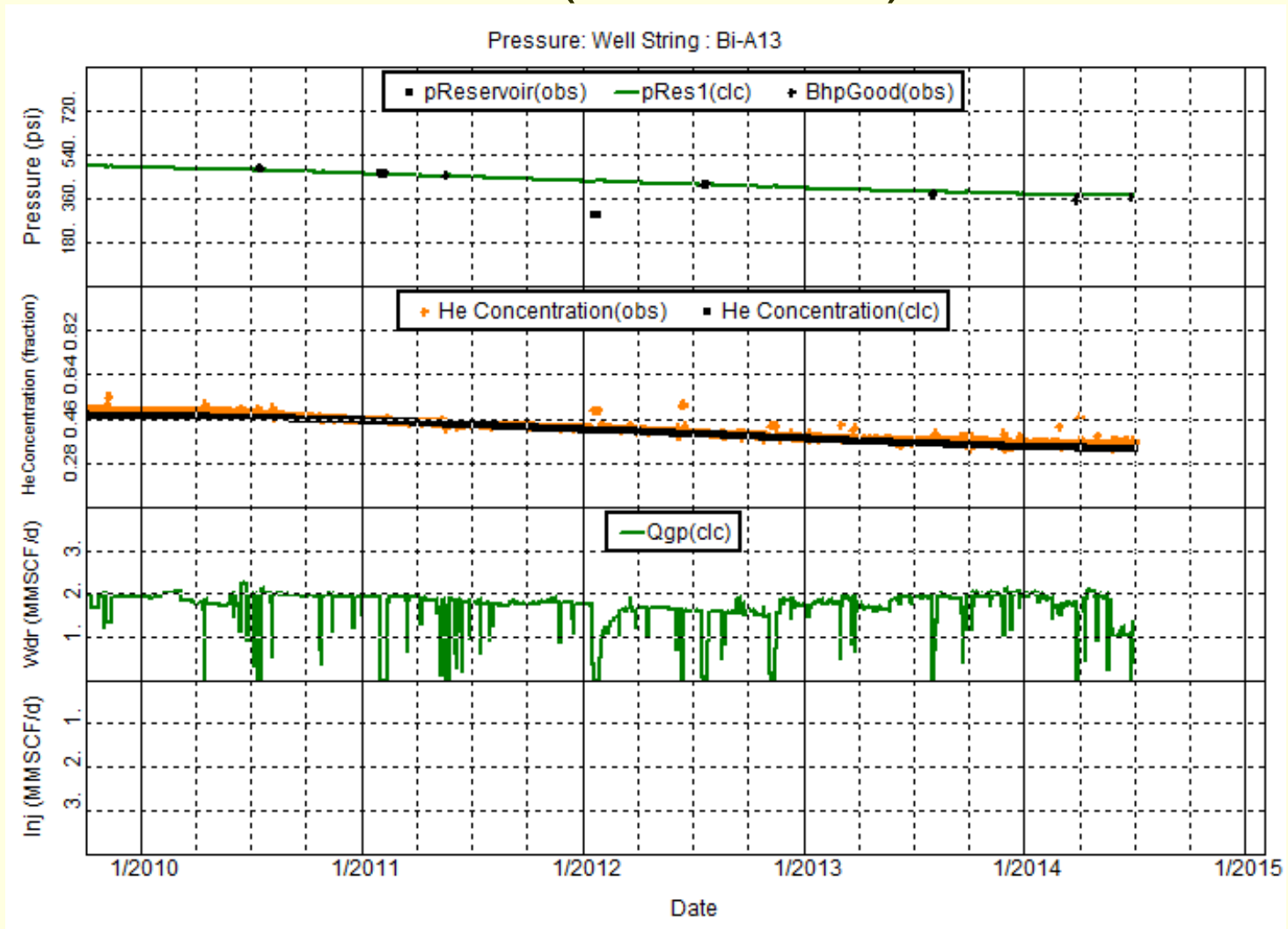
■ HM Plot – Bi-A13 (North Well)



Simulation Model Status - 2014



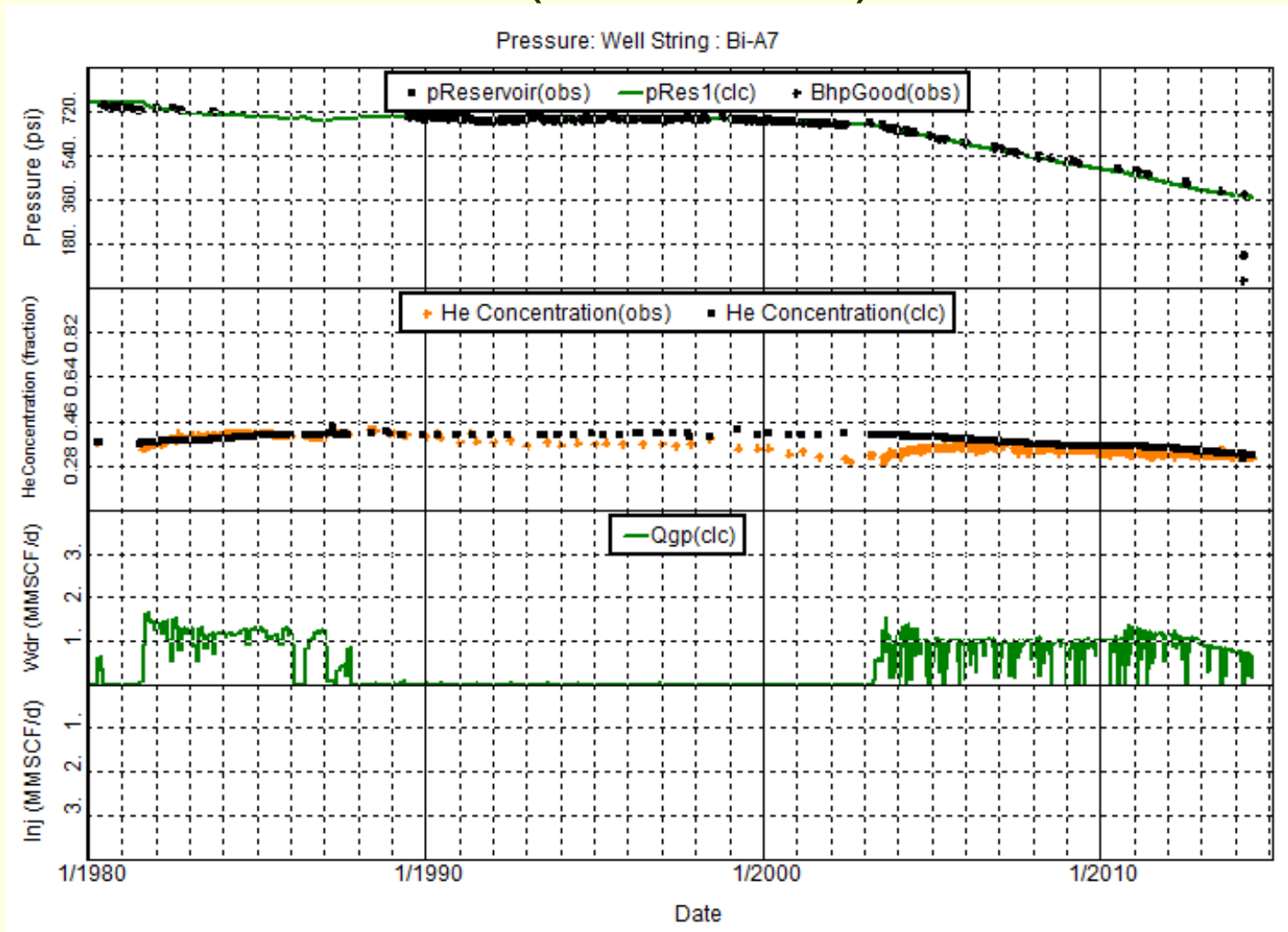
■ HM Plot – Bi-A13 (North Well)



Simulation Model Status - 2014



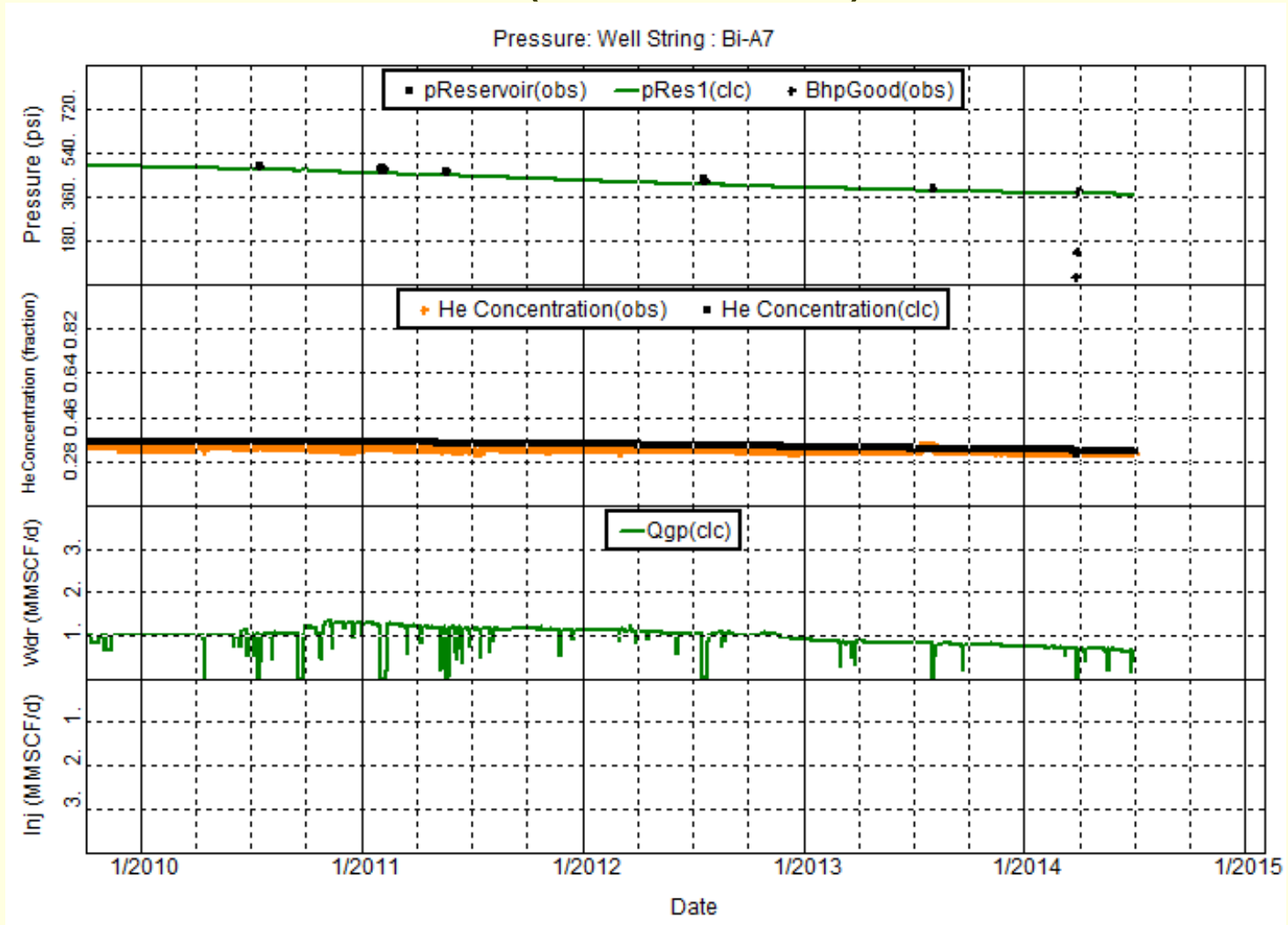
■ HM Plot – Bi-A7 (North Well)



Simulation Model Status - 2014



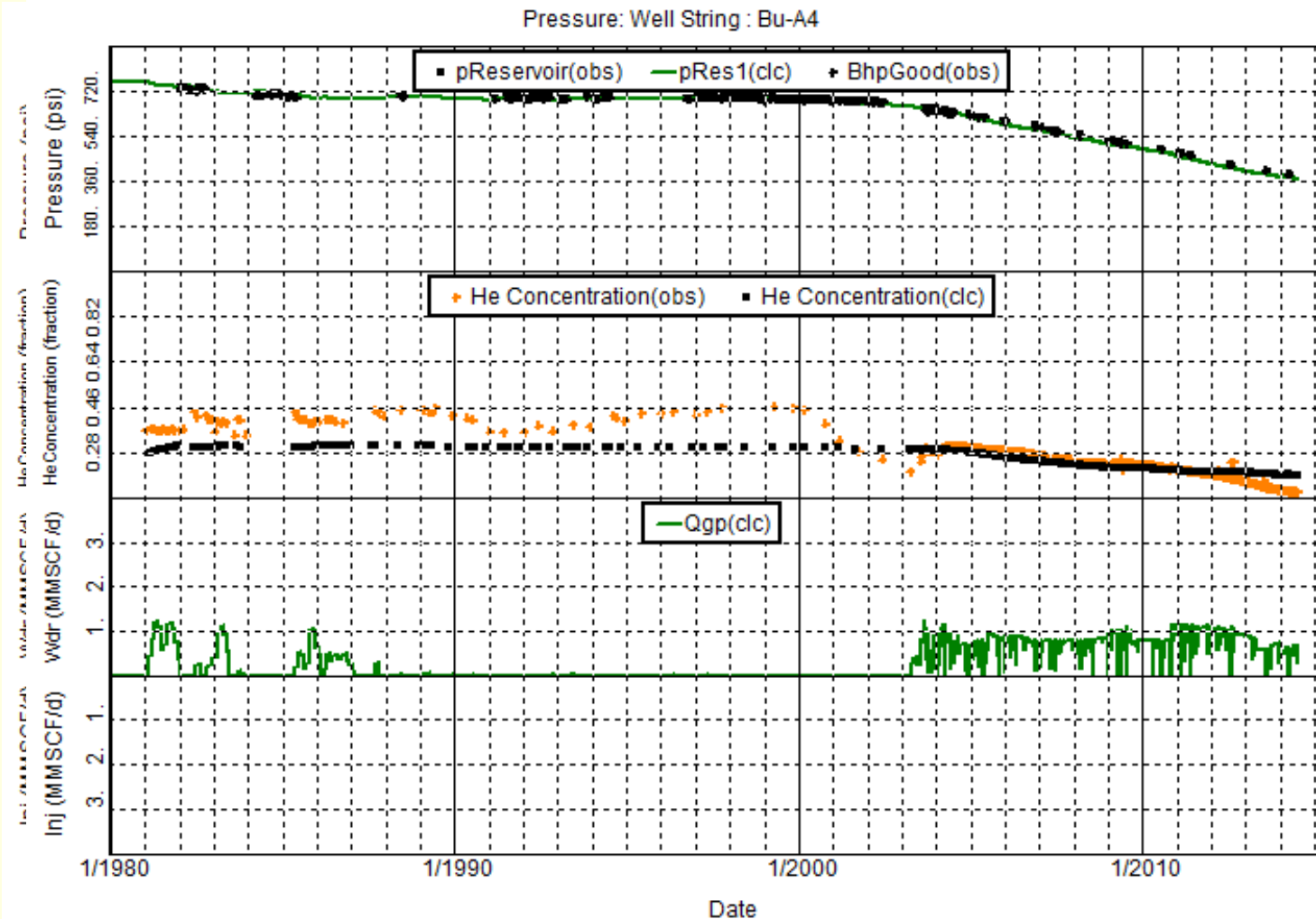
■ HM Plot – Bi-A7 (North Well)



Simulation Model Status - 2014



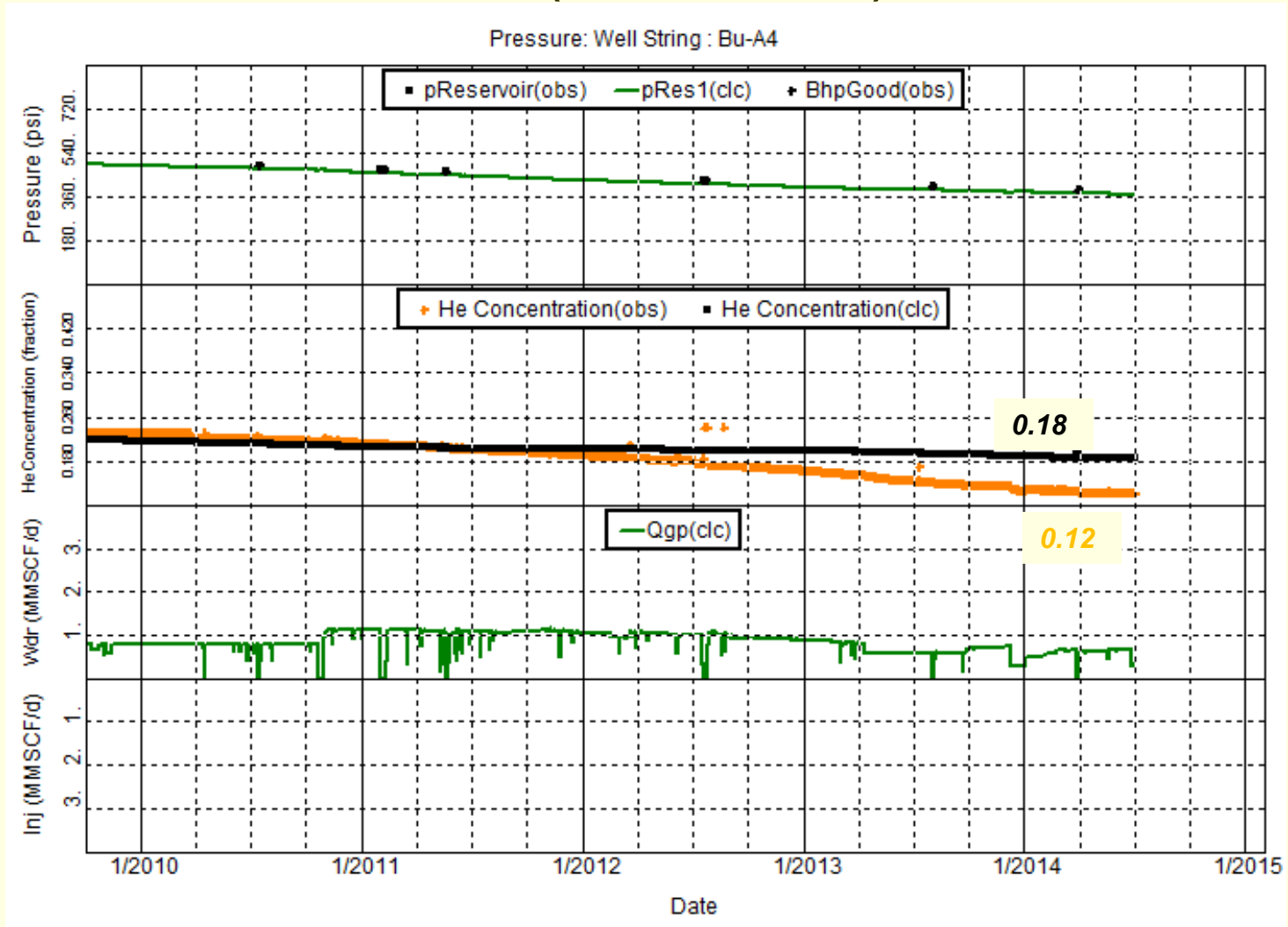
■ HM Plot – Bu-A4 (North Well)



Simulation Model Status - 2014



■ HM Plot – Bu-A4 (North Well)



Simulation Model Status - 2014

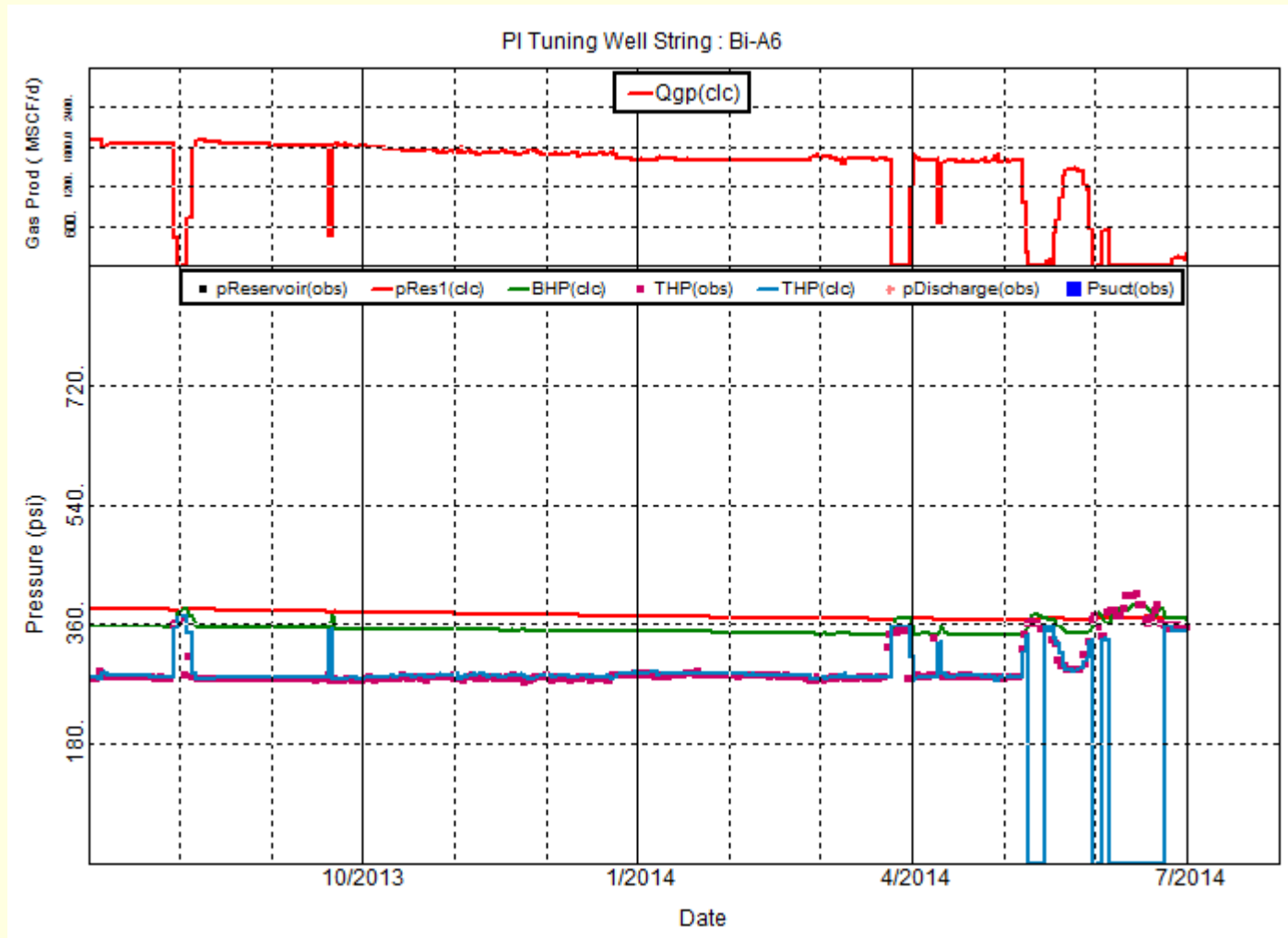


- Well Productivity Tuning (PI)
 - Final step before prediction cases
 - Tune simulation FWHP to match observed FWHP
 - Represent changes in the BH well bore conditions “skin”

Simulation Model Status - 2014



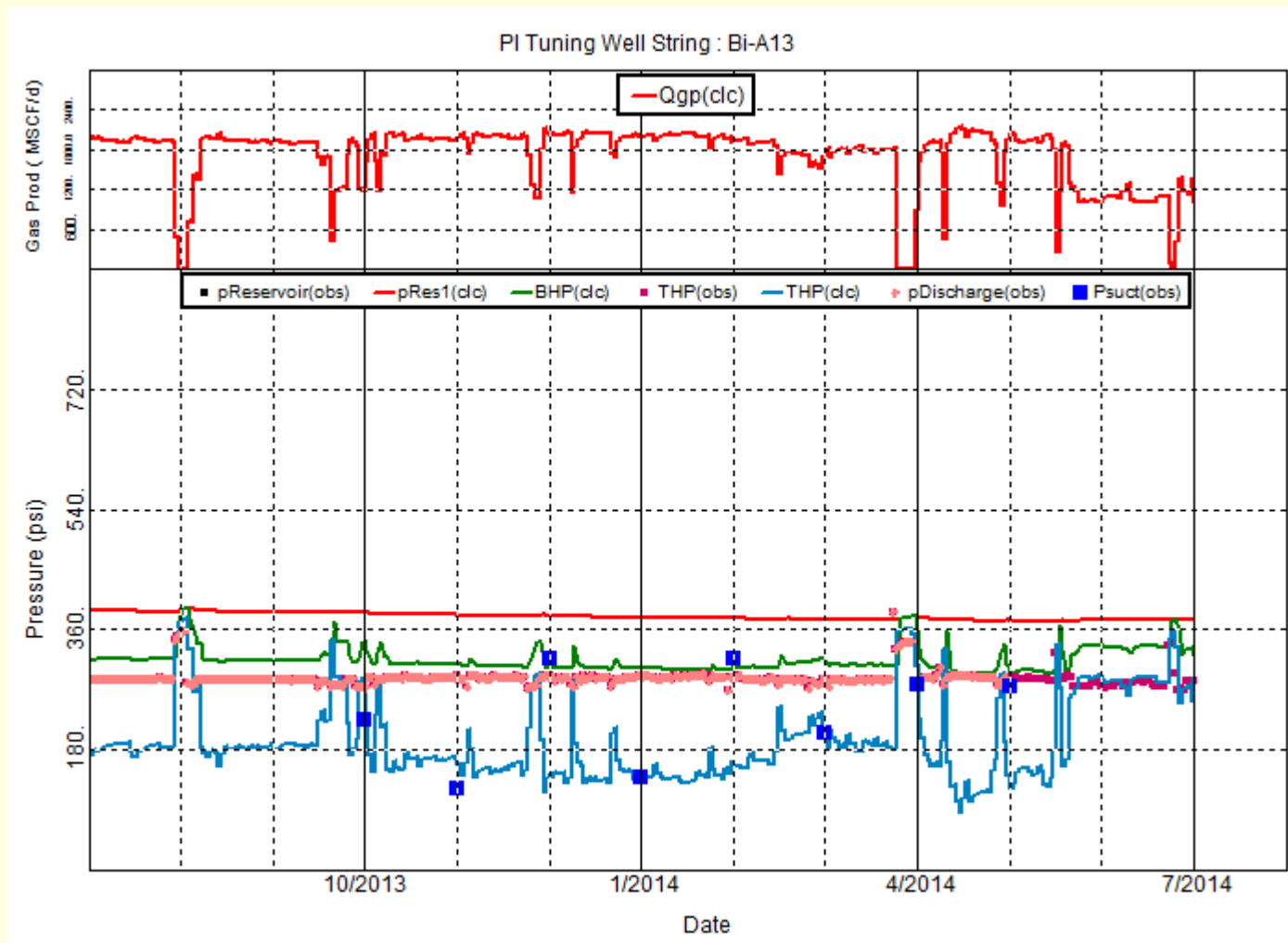
■ PI Tuning: Bi-A6



Simulation Model Status - 2014



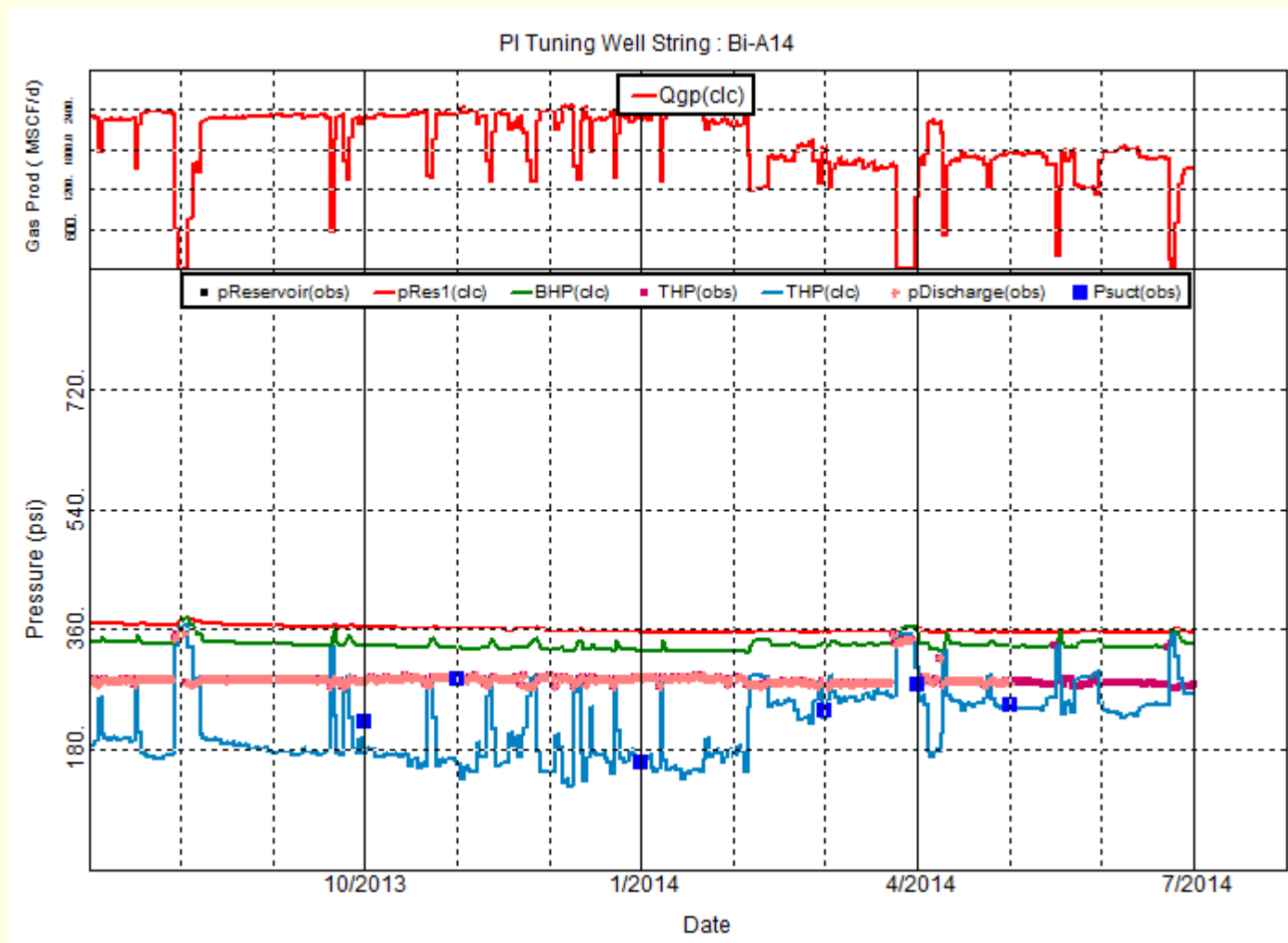
■ PI Tuning: Bi-A13 (North – compressor)



Simulation Model Status - 2014



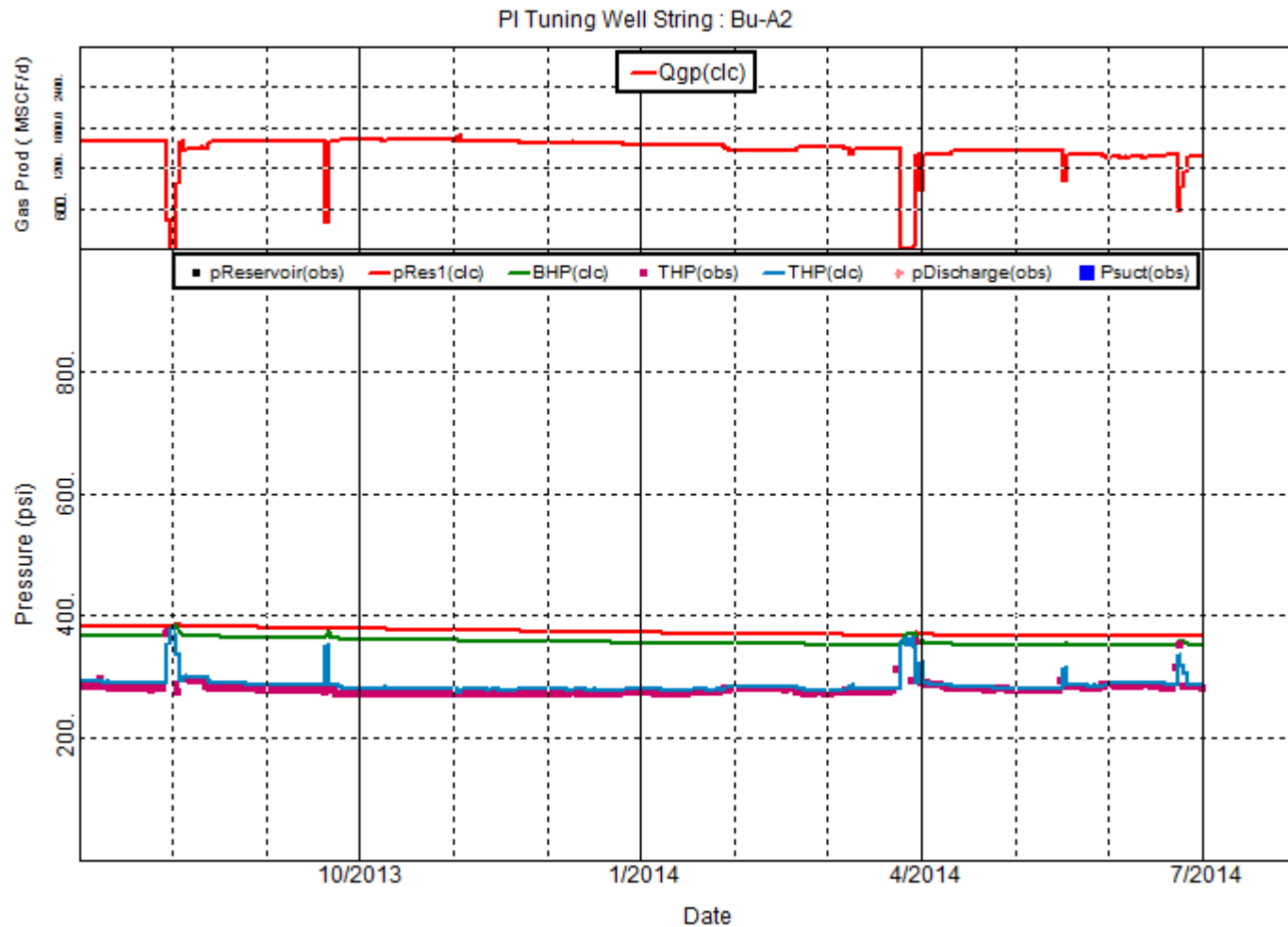
■ PI Tuning: Bi-A14 (South - compressor)



Simulation Model Status - 2014



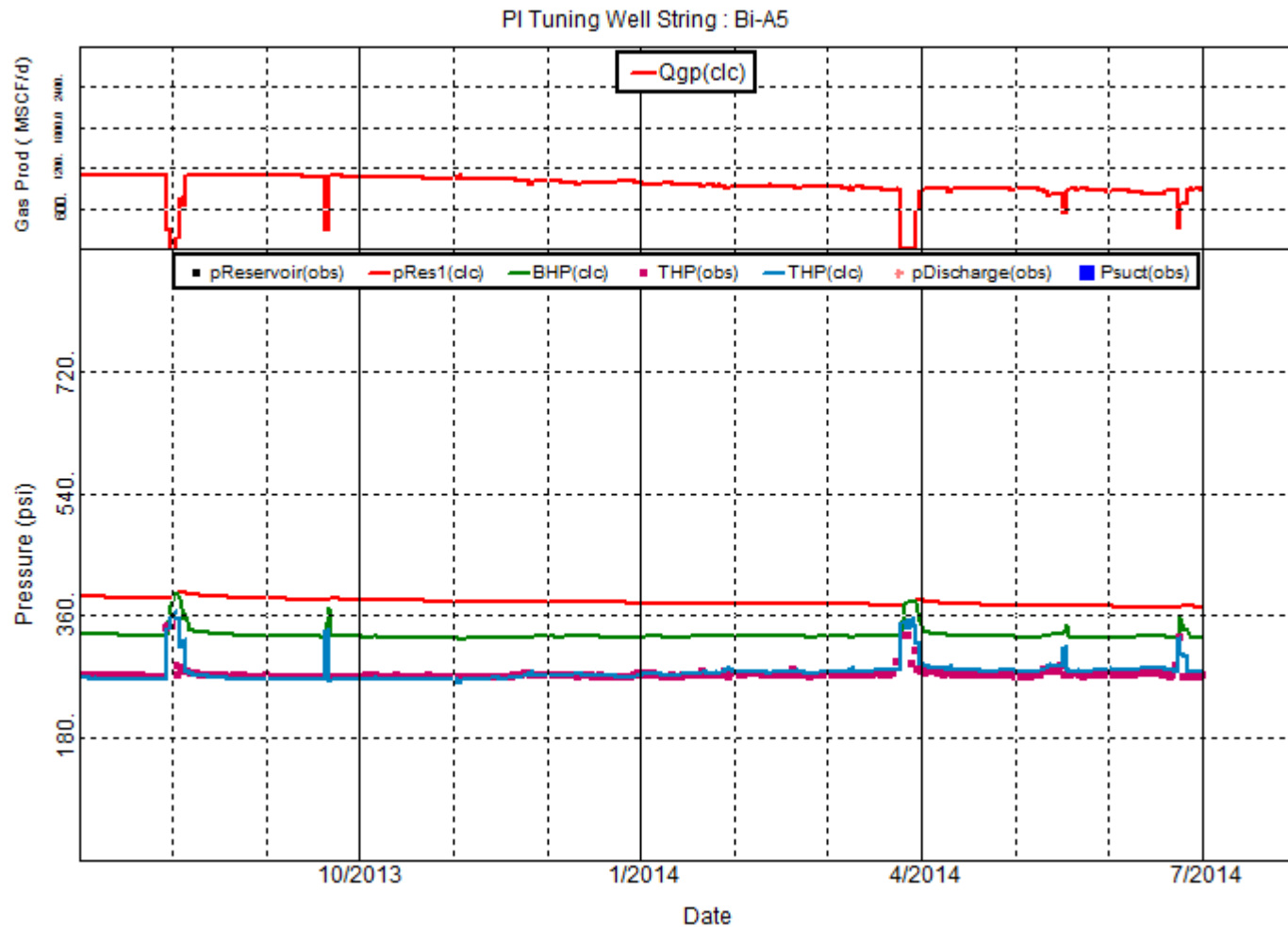
■ PI Tuning: Bu-A2 (South)



Simulation Model Status - 2014



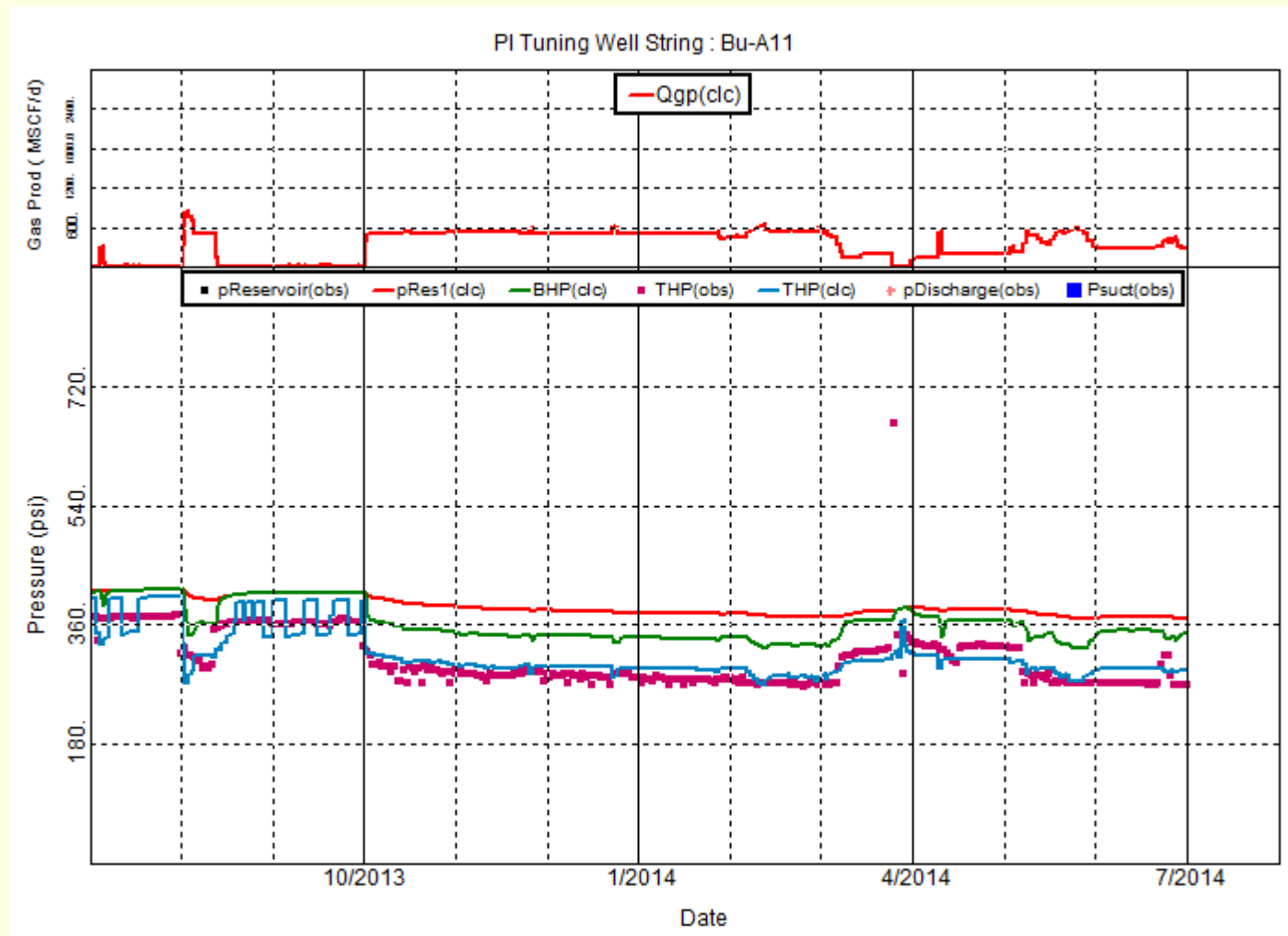
■ PI Tuning: Bi-A5 (North)



Simulation Model Status - 2014



■ PI Tuning: Bu-A11 (North – methane)



Simulation Model Status - 2014



■ Conclusions

- Model shows excellent match at field level for helium rate, concentrations and pressure
- Individual well match on helium rate / fraction shows wider variations, but averages out at field level
- No significant changes in measured water production. Model is Ok-good water match
 - Outer edge wells on east produce more water in the model than measured.
 - Other wells show good water match

Implications on Predictions - 2014



- Helium Rate / Fraction
 - Expect model will continue with same level of accuracy
- PI Tuning
 - Takes into account current well conditions. Does not take into account possible changes in bottom hole flowing conditions which can occur over time.
- Water
 - Provides indications of effects of water encroachment.
 - Cannot predict which wells will produce water from sudden water breakthroughs due to unidentified fracture connections.

Outline



- *Reservoir Status (Operations: 2013-2014)*
- *Reservoir History & Life Cycle (Depletion)*
- *Simulation Model Status*
- *Predictions*
- *Conclusions*



Denver – Bear Creek ~6300'

Prediction Cases 2014



■ Prediction cases

■ Similar to 2013:

Current conditions, Cent. Compression, Sunlight wells

■ 2 well site compressors instead of 4

■ Maximum well rates same as 2013 cases

■ Better optimized for maximum He rate, which may not reflect actual operations balancing of well rates

■ FWHP limit from July 1 – Dec 30 2014 changed to 256 psia from theoretical Pmin of 235 psia, based on actual performance 2012-2014 (minor difference in results)



■ Prediction objectives:

- What are the benefits for central compression and adding the Sunlight wells?
- When will the gas production rate fall below 16 MM/day necessary to run the HEU?
- How much helium is produced from now until 10/1/2021?
- What is best operation to maximize He recovery?

Prediction Cases 2014



■ Prediction cases

■ Case 1: Base case for current operations

- 2 well site compressors, $P_{min} = 25$ psia
- P_{min} for other wells = 256 psia
- Maximum Total & He rate

■ Case 2: Central Compression on Jan 1 2015

- $P_{min} = 70$ psia
- Target 20 MM/d, max He rate

■ Case 3: Sunlight Wells available on Jan 1 2016

- Max rate for each well set at 1600 Mcf/d
- PI's are estimate based on neighboring wells

Prediction Cases 2014



■ Results

- *Preliminary results to assist with future planning. Prediction results will be reviewed with BLM.*
- *Final annual volumes will be released by BLM.*
- *Note: all results are simulation model estimates, indicating the future trends. These predictions do not take into account production changes or future operational issues and that can occur in any gas production field – such as*
 - *Changes in He demand*
 - *Well damage/flow issues*
 - *Surface facility issues*
 - *Delays in facility upgrades, repairs, ...*

Prediction Cases 2013



■ Results

■ Case comparisons

- Graphs with rates and cumulative volumes
- Tables with rates and cumulative volumes

Prediction Cases 2014

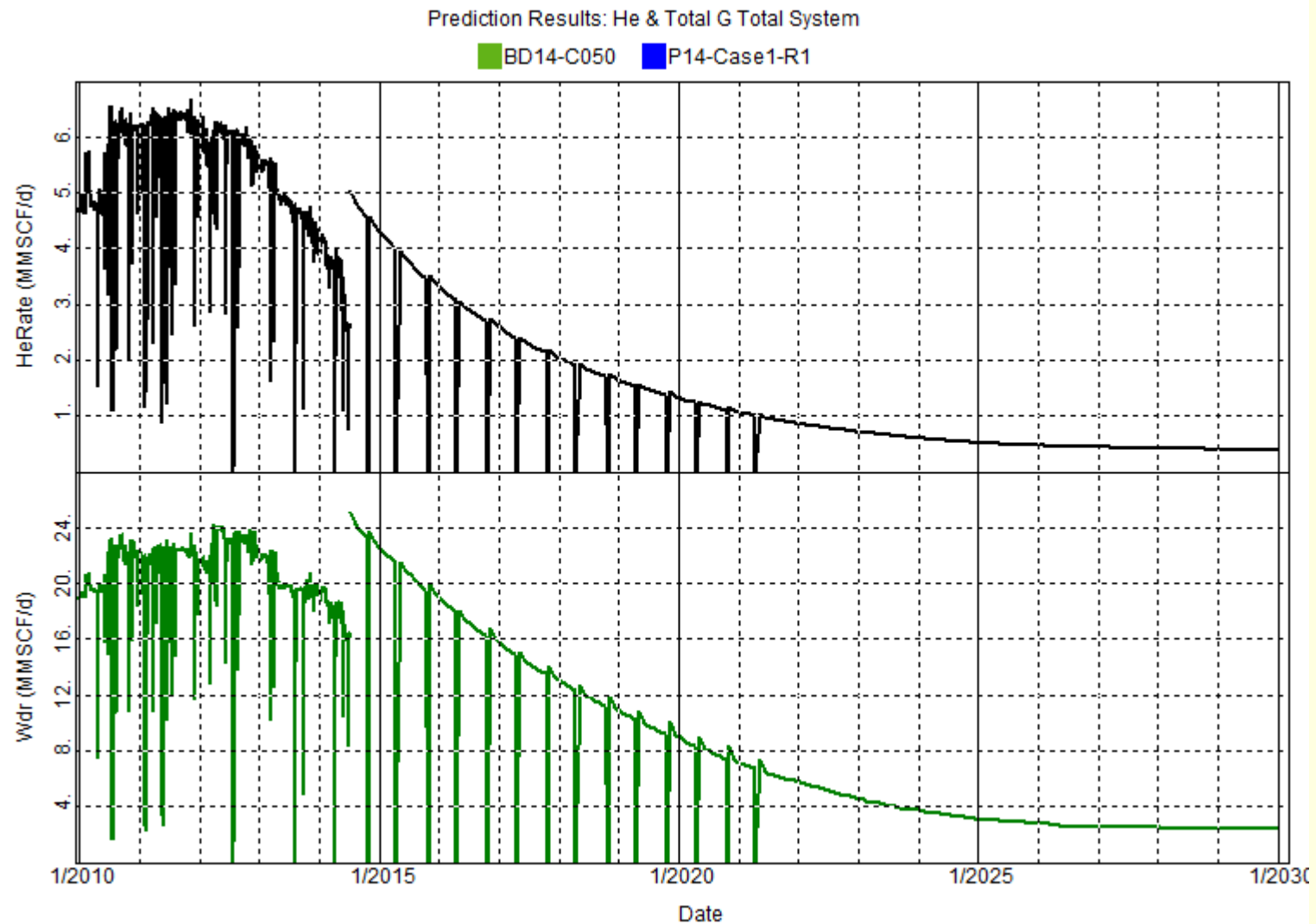


Field Results: HM 2014, Case 1 (current conditions)

Prediction Cases 2014



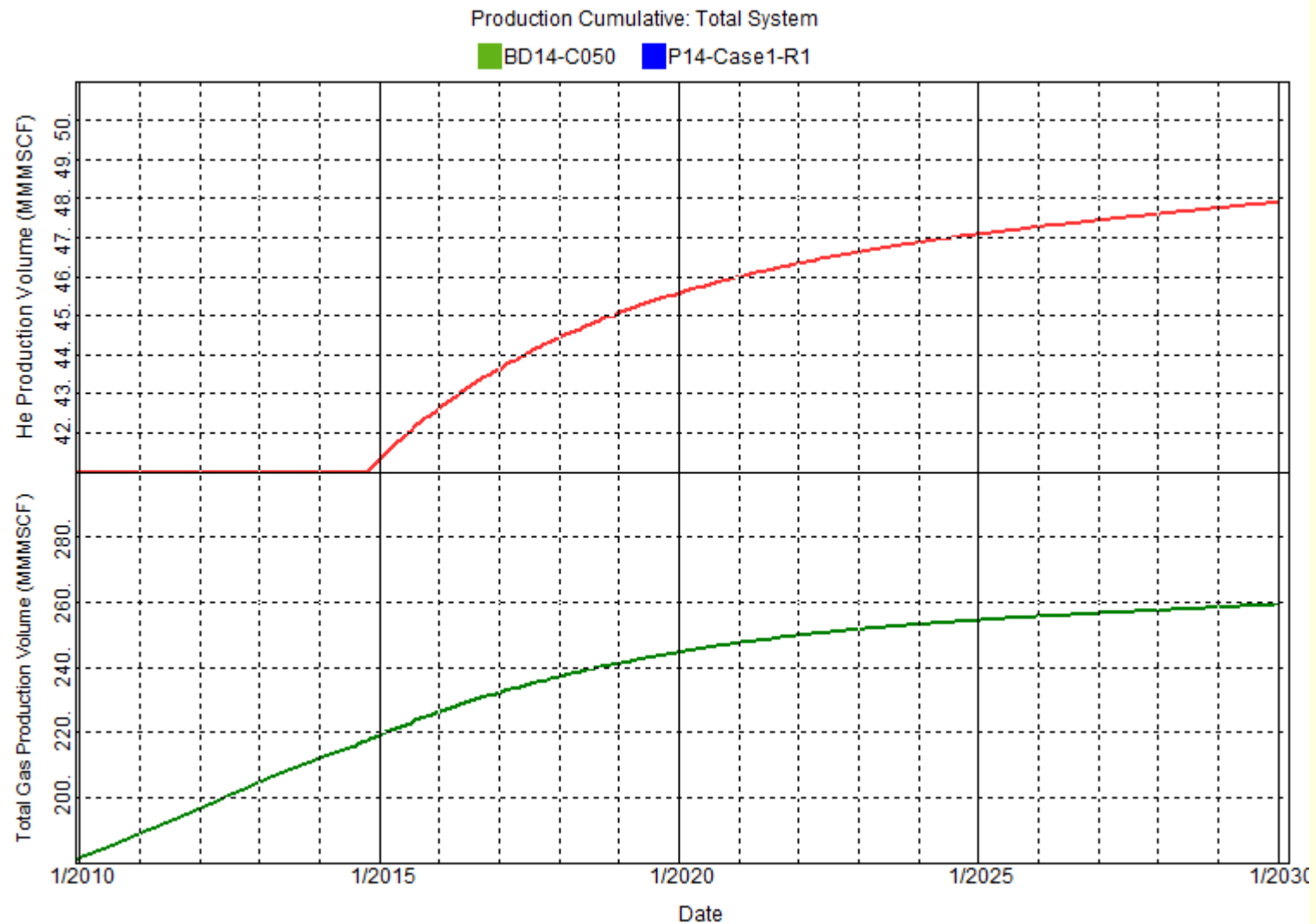
Field Results: HM 2014, Case 1 (current conditions)



Prediction Cases 2014



Field Results: HM 2014, Case 1 (current conditions)



Prediction Cases 2014

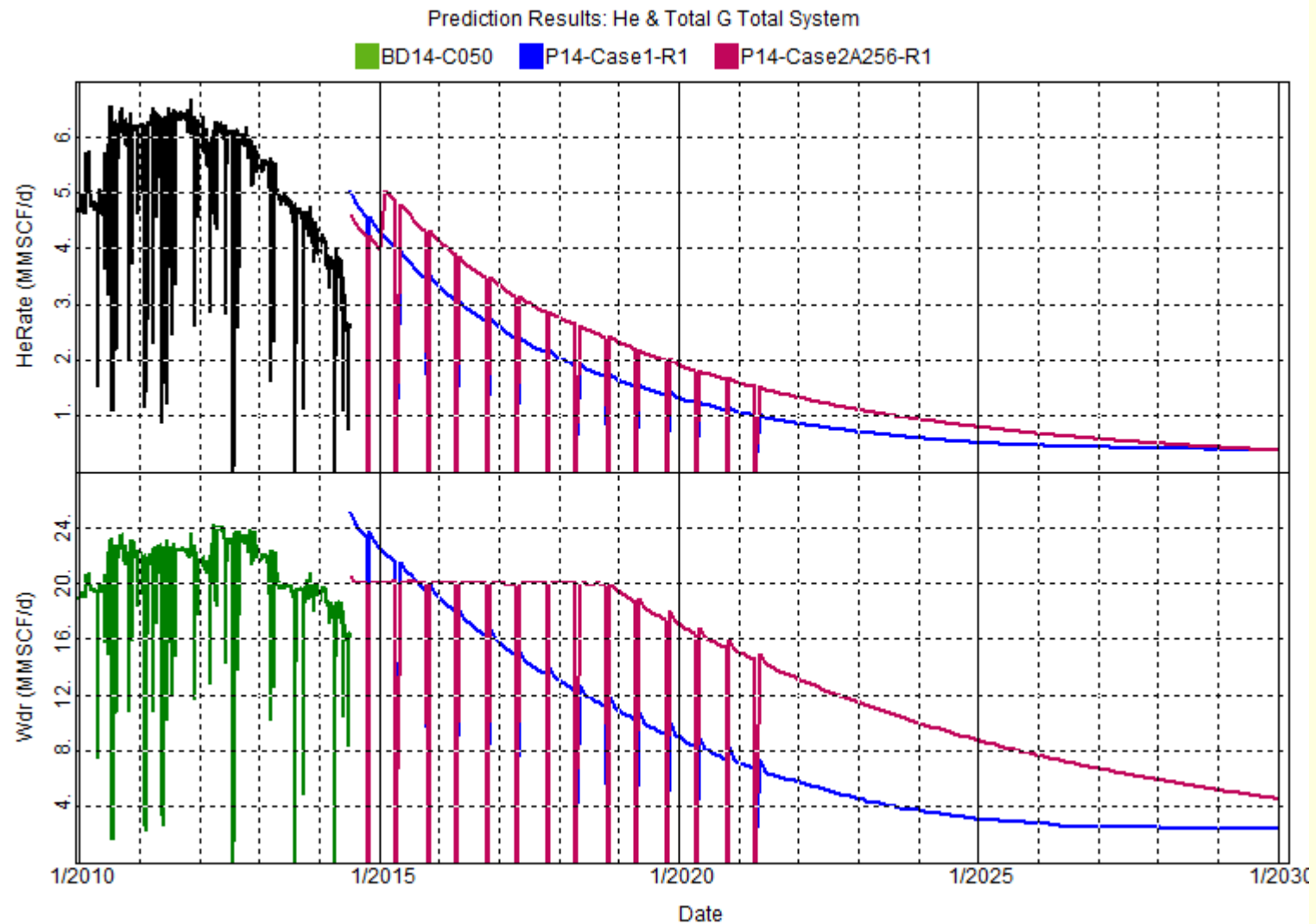


Field Results: Case2 (cent. Compressor 1/2015)

Prediction Cases 2014



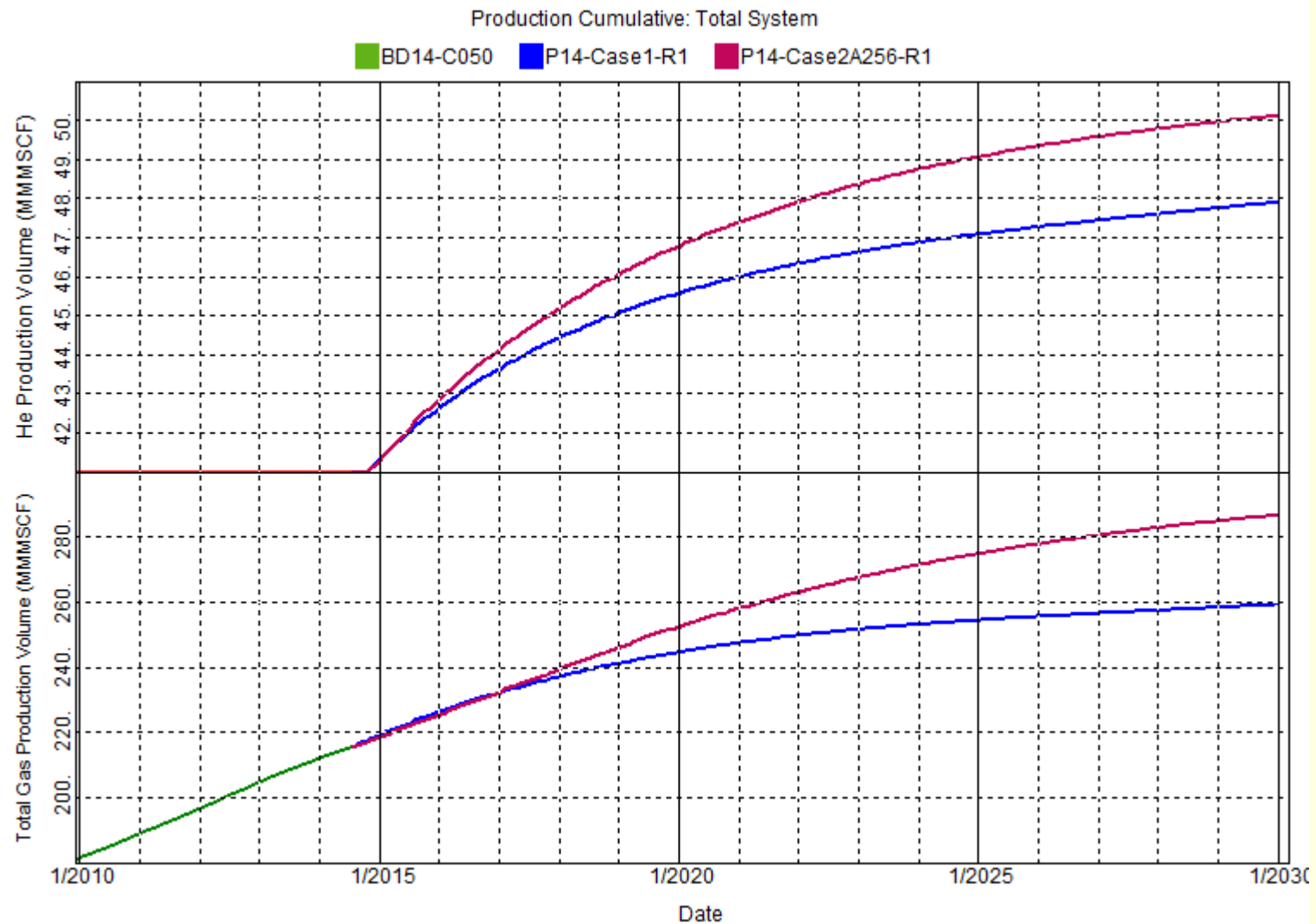
Field Results: HM 2014, Case 1, Case2 (cent. compressor)



Prediction Cases 2014



Field Results: HM 2014, Case 1, Case2 (cent. compressor)



Prediction Cases 2014



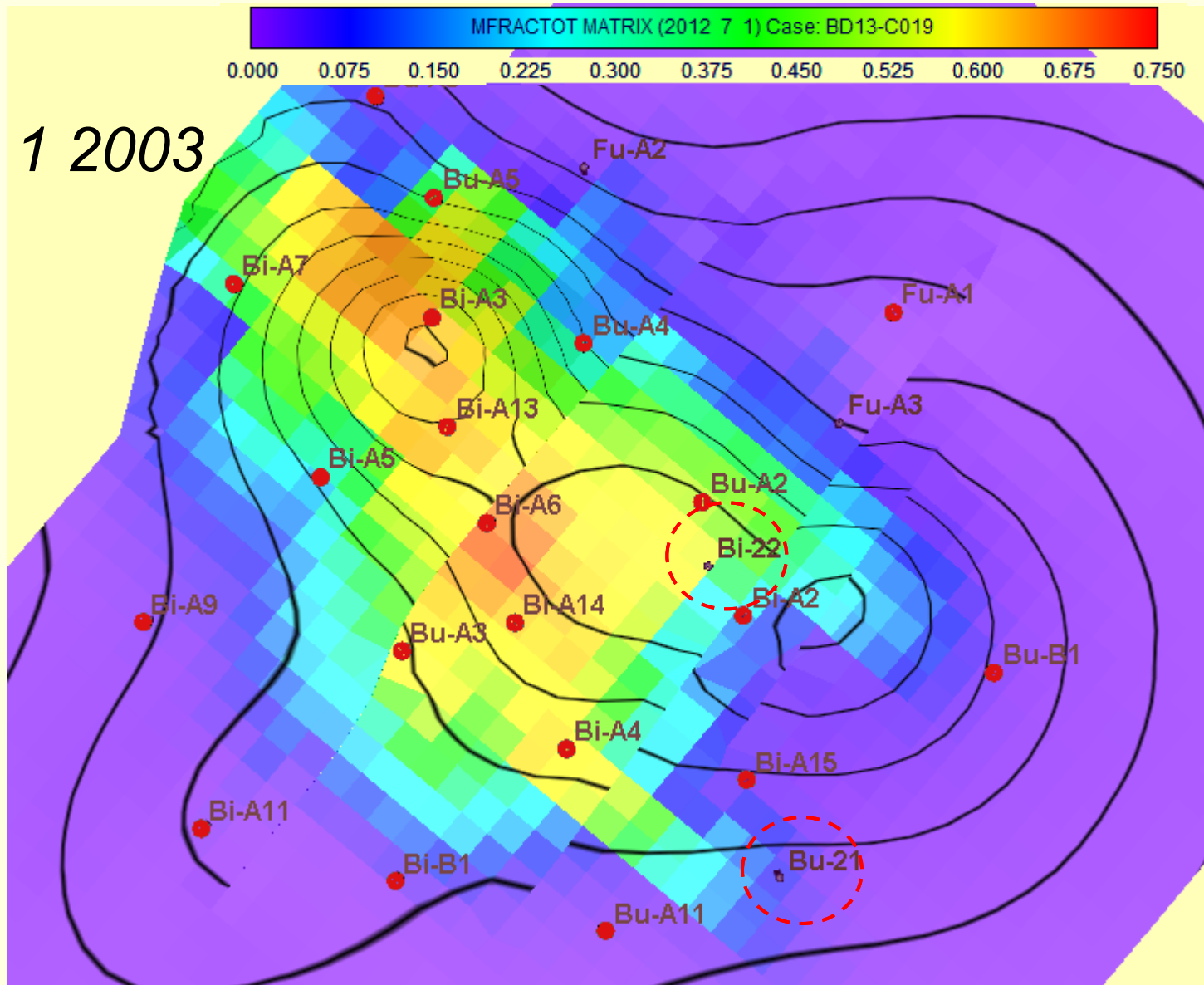
Field Results: Case 3 (Sunlight wells 1/2016) Location & He Fraction

Prediction Cases 2014

Field Results: Case 3 (Sunlight wells 1/2016) Location & He Fraction



Oct 1 2003

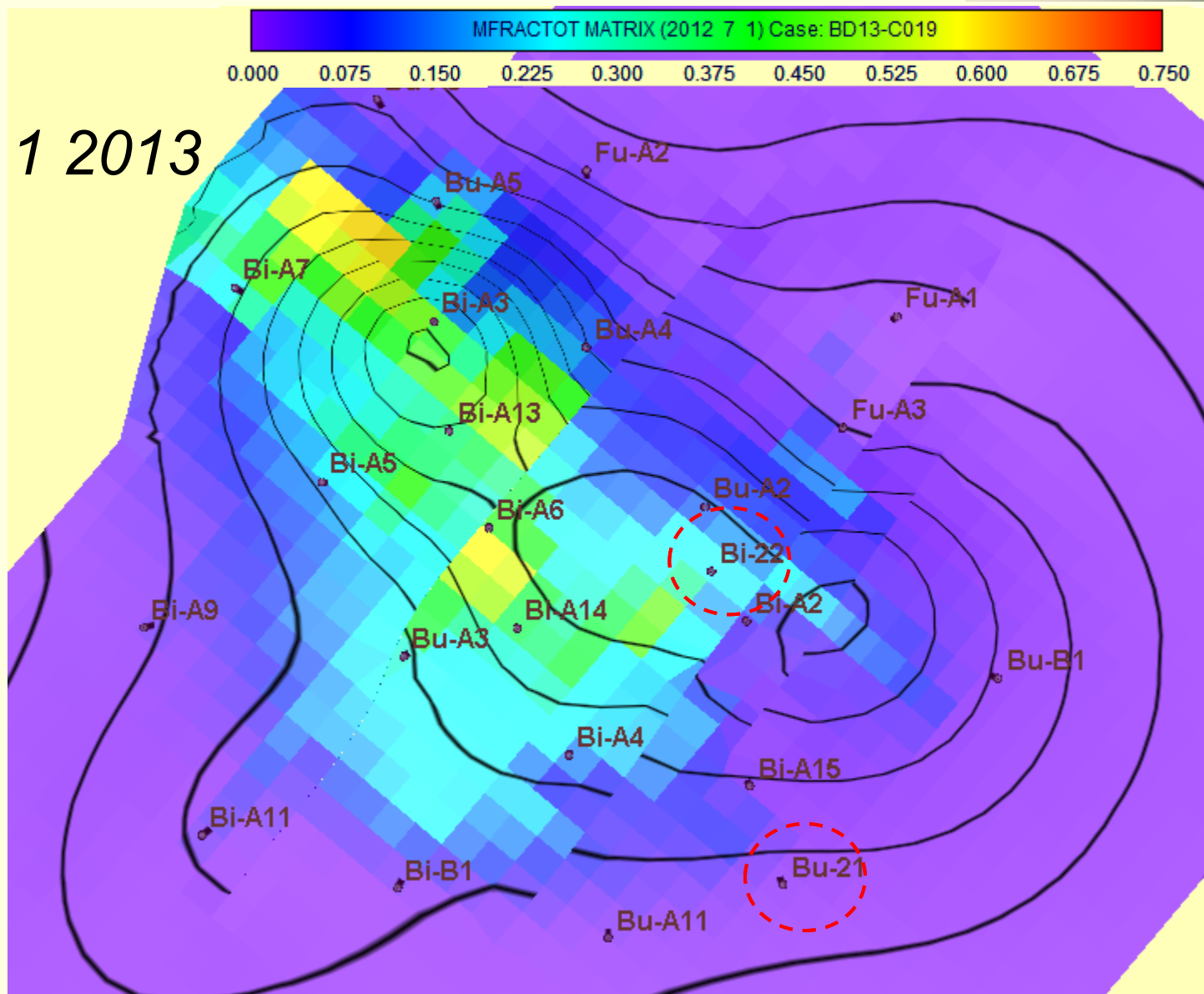


Prediction Cases 2014

Field Results: Case 3 (Sunlight wells 1/2016) Location & He Fraction



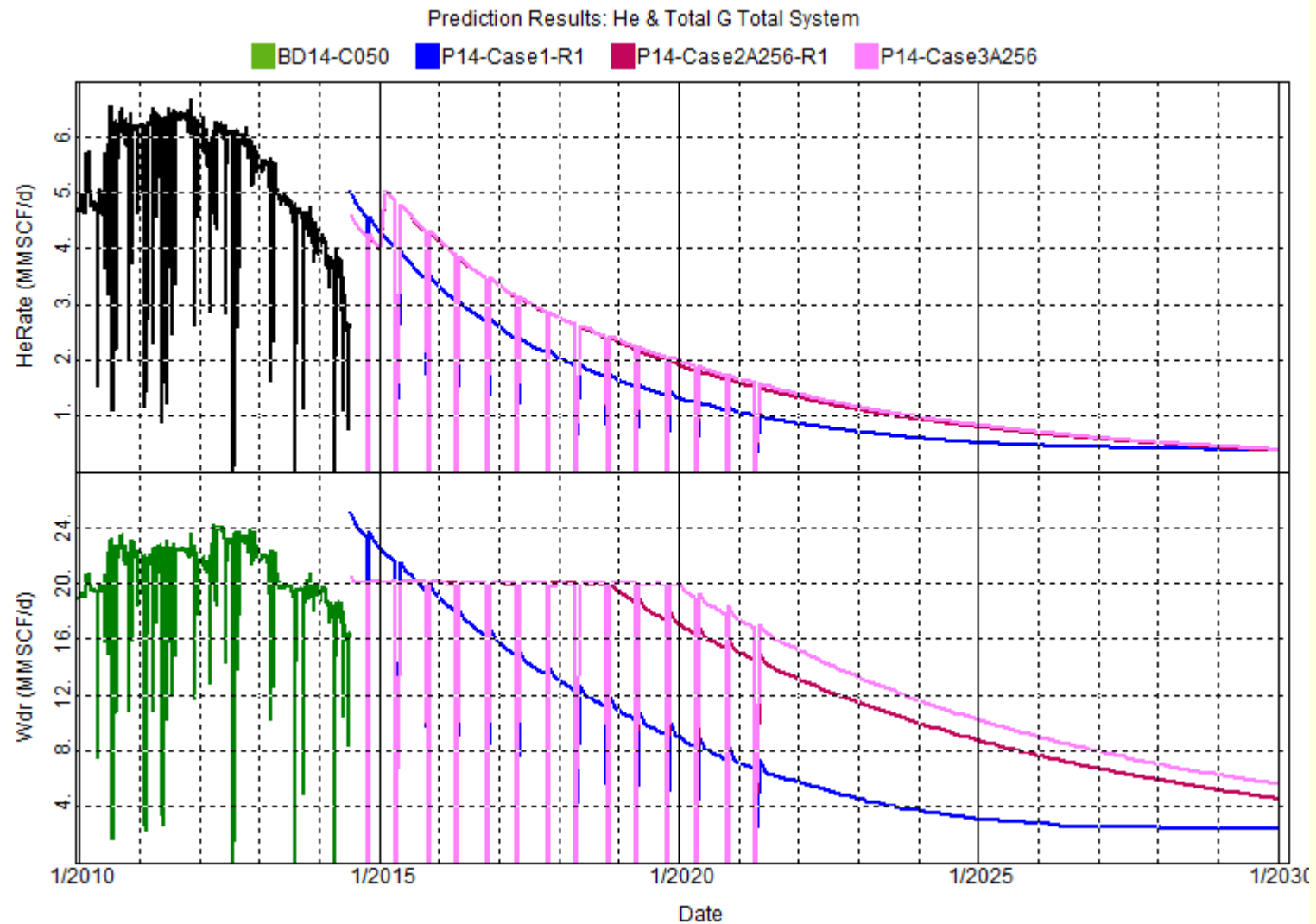
July 1 2013



Prediction Cases 2014



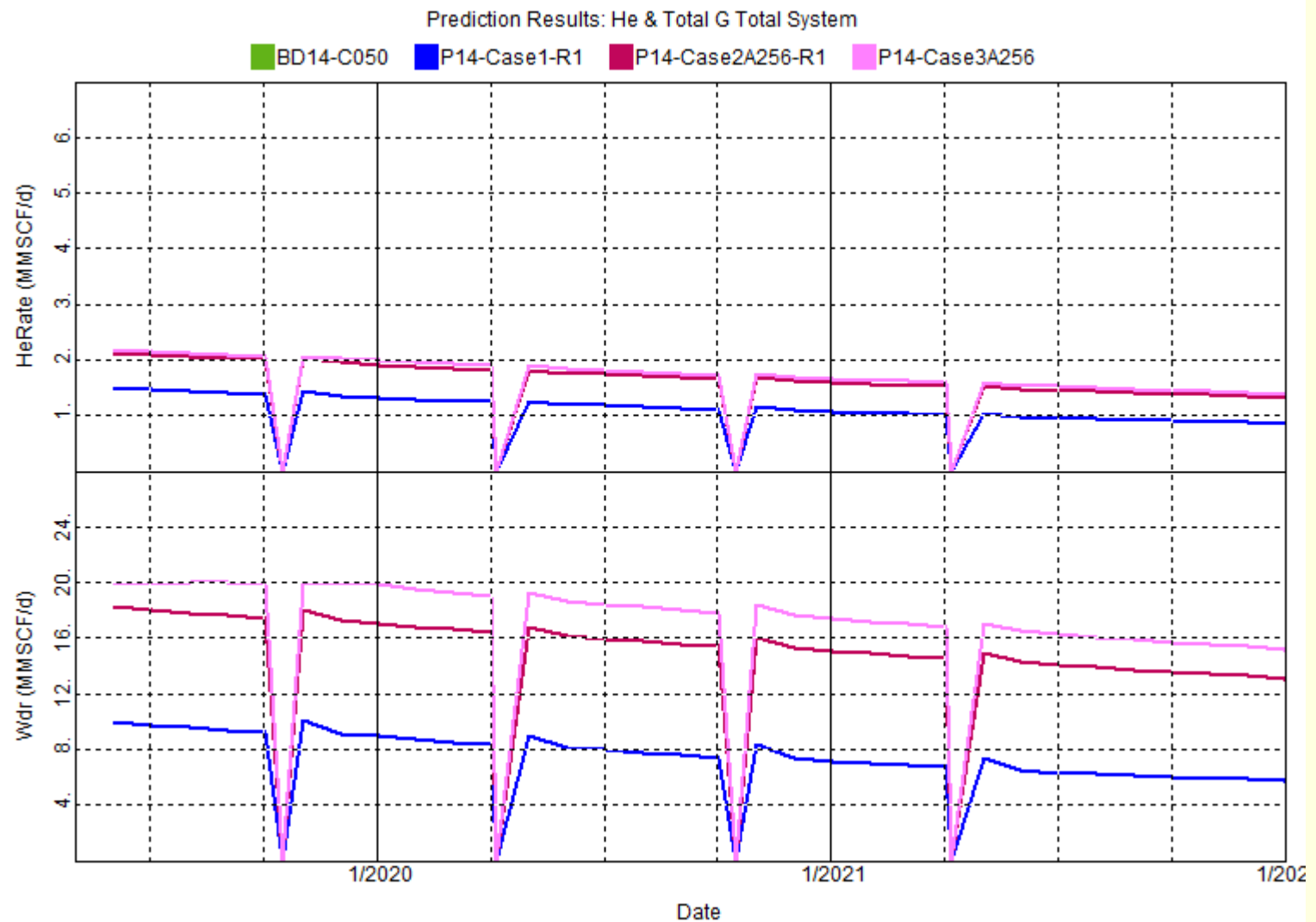
Field Results: HM 2014, Case 1, Case 2, Case 3 (Sunlight wells)



Prediction Cases 2014



Field Results: HM 2014, Case 1, Case 2, Case 3 (Sunlight wells)



Prediction Cases 2014



Field Results: HM 2014, Case 1, Case 2, Case 3 (Sunlight wells)
Key Dates / Rates

2014 Prediction Results		
Key Rates		
	Case 2 Cent Cmpr (MMcf/d)	Case 3 Sun Wells (MMcf/d)
(MMcf/d)	Date Total Gas Rate Falls Below Key Rates	
20	Oct 2018	Oct 2019
18	Aug 2019	Oct 2020
16	Aug 2020	Sep 2021**
14	Aug 2021	
12		
(MMcf/d)	Months Improved Case 3 - 2	** rate on 10/1/2021 15.8 MM/d
20	12	
18	12	
16	11**	
14		
12		

Prediction Cases 2014



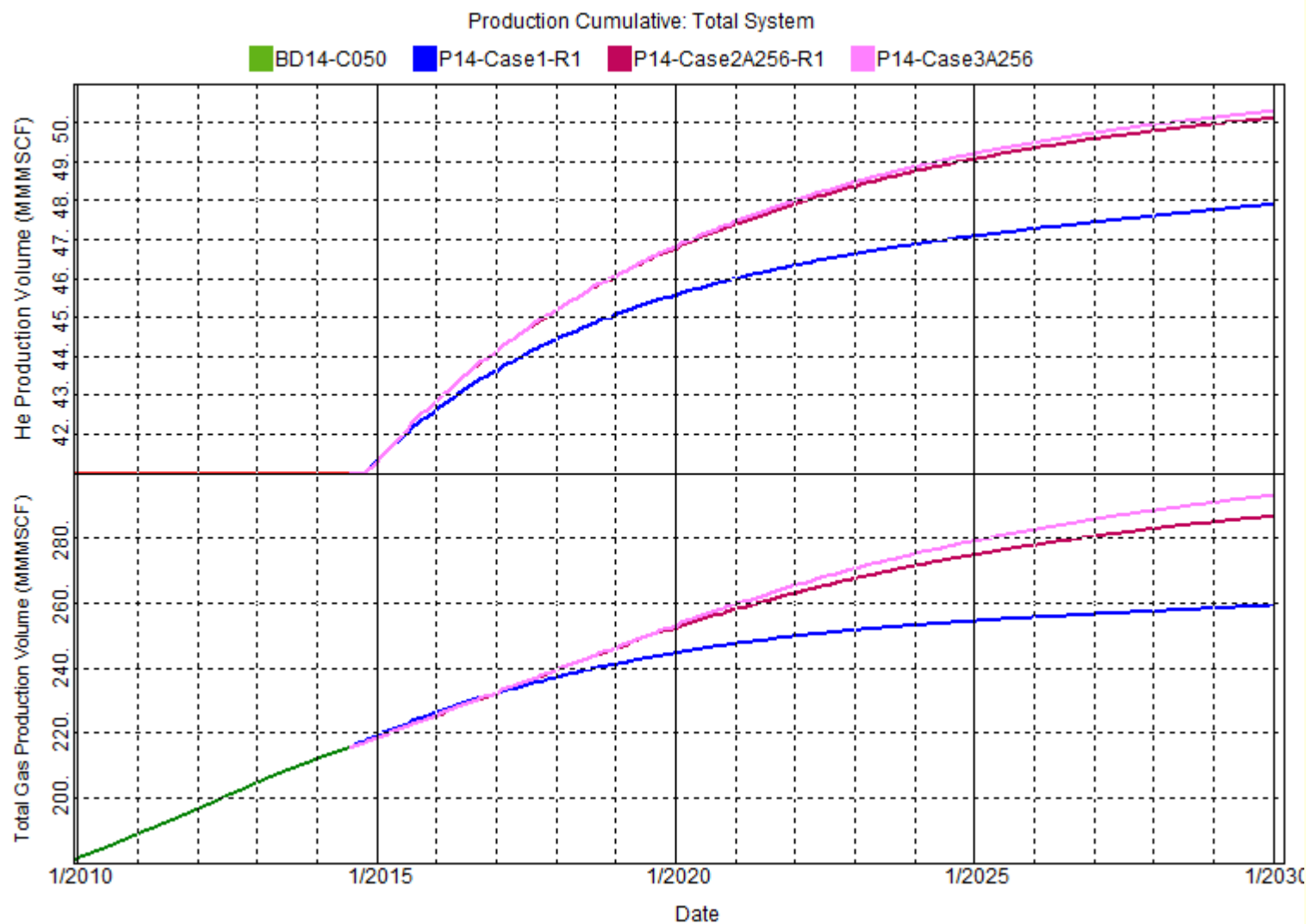
Field Results: HM 2014, Case 1, Case 2, Case 3 (Sunlight wells) Key Dates / Rates

	Case 2		Case 3	
	Avg Total Gas Rate	Avg Helium Rate	Avg Total Gas Rate	Avg Helium Rate
FY DATES	MMcf/day	MMcf/day	MMcf/day	MMcf/day
10/1/2014	20.076	4.244	20.129	4.246
10/1/2015	20.087	4.330	20.193	4.344
10/1/2016	20.047	3.491	20.084	3.496
10/1/2017	20.019	2.877	20.035	2.889
10/1/2018	19.897	2.431	20.093	2.456
10/1/2019	17.483	2.001	19.955	2.080
10/1/2020	15.472	1.668	17.853	1.742
10/1/2021	13.636	1.403	15.791	1.468
10/1/2022	11.886	1.176	13.769	1.229
10/1/2023	10.388	0.994	12.068	1.037
10/1/2024	9.085	0.846	10.600	0.881
10/1/2025	7.964	0.725	9.330	0.753
10/1/2026	6.996	0.624	8.246	0.648
10/1/2027	6.163	0.540	7.266	0.559
10/1/2028	5.422	0.468	6.501	0.487
10/1/2029	4.759	0.407	5.817	0.426

Prediction Cases 2014



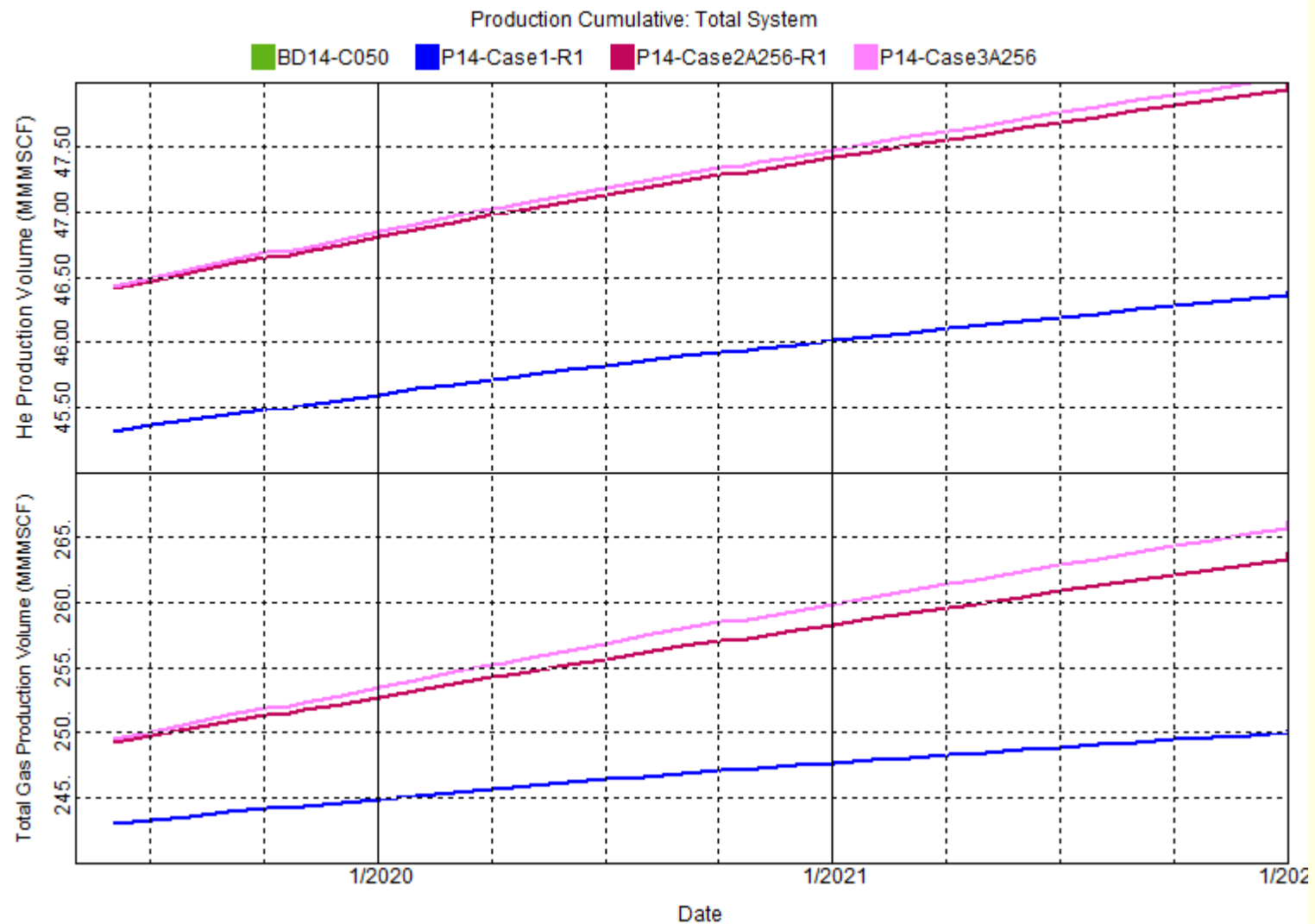
Field Results: HM 2014, Case 1, Case 2, Case 3 (Sunlight wells)



Prediction Cases 2014



Field Results: HM 2014, Case 1, Case 2, Case 3 (Sunlight wells)



Prediction Cases 2014



2014 Prediction Case Results: Annual Production						
	Helium Produced Since July 1 2014			Total Gas Produced Since July 1 2014		
	Case 1 MxG, MxHe (Bcf)	Case 2A256 T20-Cen.Cmpr (Bcf)	Case 3A256 Plus Sunlight (Bcf)	Case 1 MxG, MxHe (Bcf)	Case 2A256 T20-Cen.Cmpr (Bcf)	Case 3A256 Plus Sunlight (Bcf)
(1st of mth)						
Oct-2014	0.430	0.376	0.376	2.170	1.826	1.829
Jan-2015						
Oct-2015	1.371	1.495	1.497	7.385	6.938	6.965
Oct-2016	1.061	1.271	1.273	6.191	6.949	6.956
Oct-2017	0.833	1.033	1.036	5.138	6.917	6.921
Oct-2018	0.664	0.864	0.868	4.279	6.910	6.912
Oct-2019	0.535	0.721	0.739	3.559	6.431	6.909
Oct-2020	0.435	0.599	0.625	2.927	5.703	6.579
Oct-2021	0.352	0.501	0.523	2.359	5.029	5.808
Jan 2015						
July-2015	1.472	1.563	1.564	7.718	6.914	6.934
July-2016	1.134	1.417	1.420	6.501	6.954	6.968
July-2017	0.886	1.145	1.148	5.393	6.917	6.925
July-2018	0.705	0.951	0.955	4.494	6.915	6.909
July-2019	0.567	0.798	0.812	3.743	6.644	6.913
July-2020	0.460	0.662	0.689	3.096	5.891	6.759
July-2021	0.371	0.552	0.577	2.492	5.200	6.000

Prediction Cases 2014



2014 Prediction Case Results: Annual Production Improvement						
	Helium Produced Since July 1 2014			Total Gas Produced Since July 1 2014		
	Case 1	Case 2A256	Case 3A256	Case 1	Case 2A256	Case 3A256
	MxG, MxHe	T20-Cen.Cmpr	Plus Sunlight	MxG, MxHe	T20-Cen.Cmpr	Plus Sunlight
(1st of mth)	(Bcf)	(Bcf)	(Bcf)	(Bcf)	(Bcf)	(Bcf)
Oct-2014	-0.053	-0.053	0.000	-0.341	-0.344	0.003
Jan-2015						
Oct-2015	0.126	0.124	0.002	-0.420	-0.446	0.026
Oct-2016	0.212	0.209	0.003	0.766	0.758	0.008
Oct-2017	0.203	0.200	0.003	1.782	1.779	0.003
Oct-2018	0.204	0.199	0.005	2.633	2.631	0.003
Oct-2019	0.203	0.185	0.018	3.349	2.872	0.478
Oct-2020	0.191	0.165	0.026	3.652	2.776	0.876
Oct-2021	0.171	0.149	0.022	3.449	2.670	0.779
Jan 2015						
July-2015	0.092	0.091	0.001	-0.785	-0.804	0.020
July-2016	0.286	0.283	0.004	0.468	0.453	0.015
July-2017	0.261	0.259	0.002	1.532	1.524	0.008
July-2018	0.250	0.246	0.004	2.415	2.421	-0.006
July-2019	0.246	0.232	0.014	3.170	2.901	0.269
July-2020	0.230	0.203	0.027	3.664	2.795	0.869
July-2021	0.205	0.181	0.024	3.508	2.708	0.801

Prediction Cases 2014



2014 Prediction Case Results: Cumulative Production						
(1st of mth)	Helium Produced Since July 1 2014			Total Gas Produced Since July 1 2014		
	Case 1	Case 2A256	Case 3A256	Case 1	Case 2A256	Case 3A256
	MxG, MxHe (Bcf)	T20-Cen.Cmpr (Bcf)	Plus Sunlight (Bcf)	MxG, MxHe (Bcf)	T20-Cen.Cmpr (Bcf)	Plus Sunlight (Bcf)
Oct-2014	0.430	0.376	0.376	2.170	1.826	1.829
Jan-2015	0.770	0.677	0.677	3.942	3.369	3.380
Oct-2015	1.801	1.871	1.874	9.554	8.764	8.794
Oct-2016	2.862	3.142	3.147	15.745	15.713	15.750
Oct-2017	3.695	4.175	4.182	20.883	22.630	22.670
Oct-2018	4.359	5.038	5.051	25.162	29.540	29.583
Oct-2019	4.895	5.759	5.789	28.721	35.971	36.491
Oct-2020	5.329	6.358	6.414	31.648	41.674	43.070
Oct-2021	5.681	6.859	6.938	34.007	46.703	48.879
Jan-2015	0.770	0.677	0.677	3.942	3.369	3.380
July-2015	1.472	1.485	1.486	7.718	6.914	6.934
July-2016	2.606	2.831	2.835	14.219	13.868	13.902
July-2017	3.492	3.919	3.926	19.612	20.784	20.827
July-2018	4.197	4.822	4.833	24.106	27.699	27.736
July-2019	4.764	5.581	5.605	27.849	34.344	34.649
July-2020	5.223	6.210	6.260	30.945	40.234	41.408
July-2021	5.595	6.735	6.807	33.437	45.434	47.409

Prediction Cases 2014

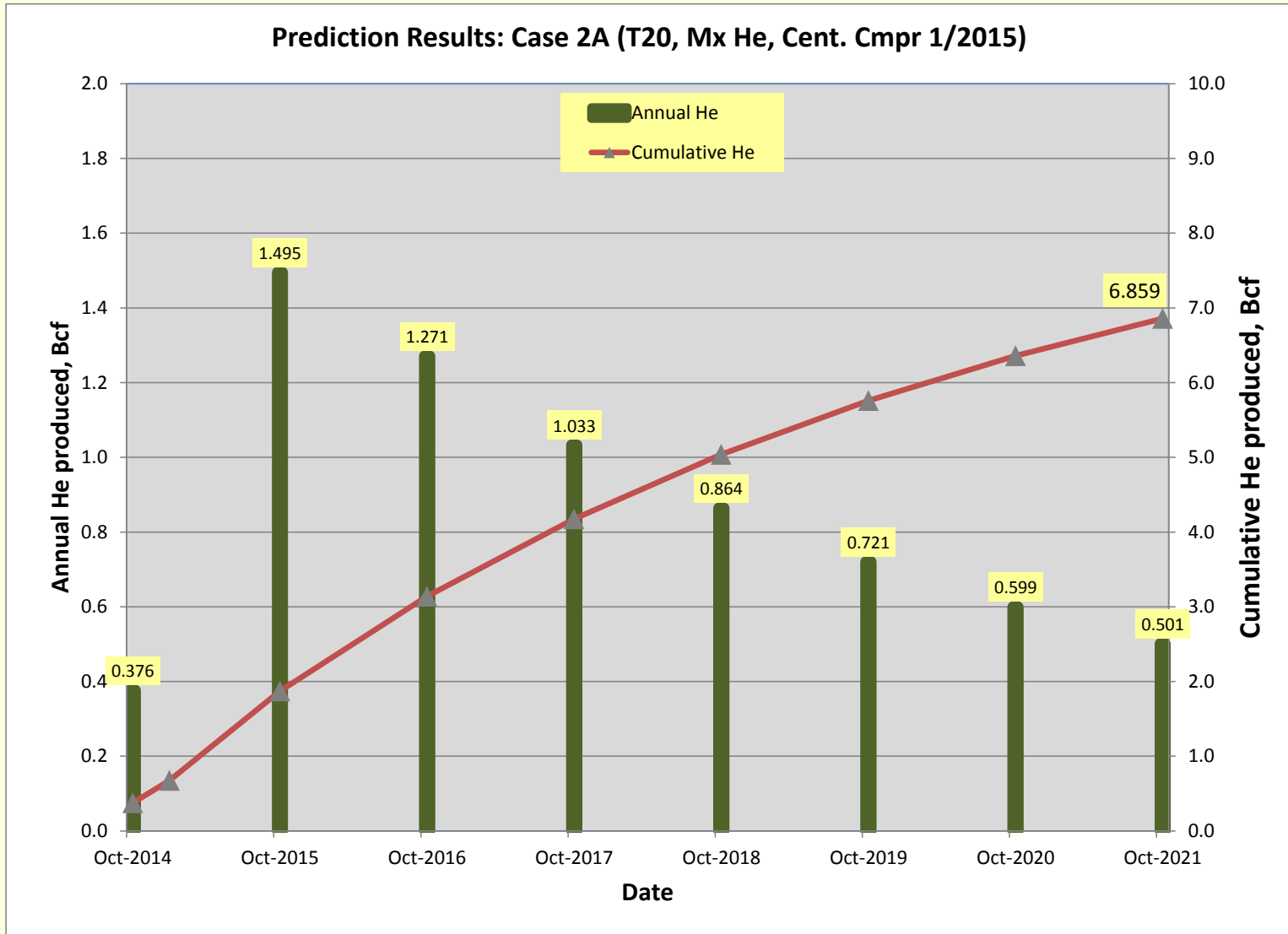


2014 Prediction Case Results: Cumulative Production Improvement						
	Helium Produced Since July 1 2014			Total Gas Produced Since July 1 2014		
	Diff C3A - C1	Diff C2A - C1	Case 3A256 C3A - C2	Case 1 MxG, MxHe	Case 2A256 T20-Cen.Cmpr	Case 3A256 Plus Sunlight
(1st of mth)	(Bcf)	(Bcf)	(Bcf)	(Bcf)	(Bcf)	(Bcf)
Oct-2014	-0.053	-0.053	0.000	-0.341	-0.344	0.003
Jan-2015	-0.093	-0.094	0.001	-0.561	-0.572	0.011
Oct-2015	0.073	0.071	0.002	-0.761	-0.790	0.029
Oct-2016	0.285	0.280	0.005	0.005	-0.032	0.037
Oct-2017	0.487	0.480	0.008	1.787	1.747	0.040
Oct-2018	0.691	0.679	0.012	4.421	4.378	0.043
Oct-2019	0.895	0.864	0.030	7.770	7.250	0.520
Oct-2020	1.085	1.029	0.056	11.422	10.026	1.397
Oct-2021	1.256	1.178	0.078	14.871	12.696	2.175
Jan-2015	-0.093	-0.094	0.001	-0.561	-0.572	0.011
July-2015	0.014	0.013	0.001	-0.785	-0.804	0.020
July-2016	0.229	0.225	0.004	-0.317	-0.352	0.034
July-2017	0.433	0.427	0.007	1.215	1.172	0.042
July-2018	0.636	0.625	0.010	3.630	3.593	0.036
July-2019	0.841	0.817	0.024	6.800	6.494	0.305
July-2020	1.036	0.987	0.049	10.463	9.289	1.174
July-2021	1.212	1.140	0.073	13.972	11.997	1.975

Prediction Cases 2014



Case 2: Target 20 MM/d, Mx He Rate, Central Compression 1/2015



Outline



- *Reservoir Status (Operations: 2013-2014)*
- *Reservoir History & Life Cycle (Depletion)*
- *Simulation Model Status*
- *Predictions*
- **Conclusions**



Swan Mtn – 9,700’

July 31, 2014

Conclusions



■ Conclusions

- 2014 model update has improved prediction results, but results are within +/- accuracy (~200-300 MMcf He)
- Without central compression, the total gas rate will fall below 20 MMcf/d by Apr 2015, below 16 MM by 2017.
- Helium and Total Gas cumulative production are significantly improved with central compression
~1.2 BCF Helium & 12 BCF Total Gas by Oct 2021
- There is a small incremental benefit associated with putting the Sunlight Wells in to production:
~75 MM Helium & 2.1 BCF Total Gas by Oct 2021, but length of time at 16 MM/d is improved by 11-12 months

Conclusions



■ Conclusions

- The field is in its final production decline phase.
- Central compression is necessary to maximize the recovery of the helium due to the operating constraints of the HEU
- Even with central compression, the helium production rate will continue to decline each day/month/year
- The declining rates will impact the volume/month of private industry He inventory (Deferred Delivery) that can be delivered as available production will be divided between In-Kind, New Sales and Deferred Delivery volumes

Conclusions



■ Conclusions

- The best operating strategy is to produce gas at the highest possible helium concentration with the lowest possible total gas production.
- Extended period of low demand with possible He Injection is detrimental to maximizing He recovery.
- The impact of extended period of low He demand needs to be analyzed
- Prediction cases continue to show that cumulative He production through 2021 will produce all the current private industry inventory and new sales to the HSA-2013 specified 3 BCF of conservation He level.

Discussion



- Questions, comments, concerns ?



*Courage Classic Finish Line Day 2
Eli age 8 on tandem*

Bushdome Helium Reservoir

*Thank
You!*

2002

2014

He Concentration

2021

